MACHINE TOOL EXPOSITION NUMBER SEPTEMBER, 1960

Machinery

New Gleason quenching machine applies pulsating pressure to avoid residual stresses. Produces precision parts, uniformly hardened. For details, see advertisement, page 51.

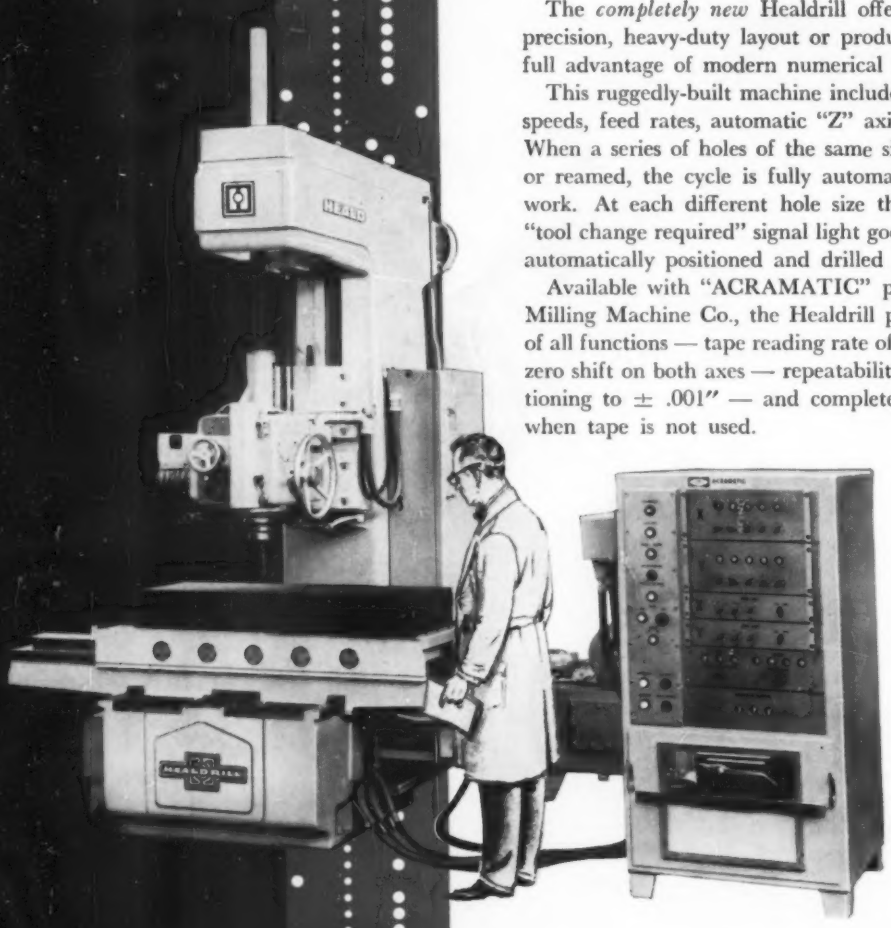
NEW HEALDRILL

...a high-precision drilling machine designed for fully automatic NUMERICAL CONTROL OF ALL FUNCTIONS

The *completely new* Healdrill offers you, for the first time, a high-precision, heavy-duty layout or production drill that's designed to take full advantage of modern numerical control.

This ruggedly-built machine includes tape control of table positioning, speeds, feed rates, automatic "Z" axis cycle and tool-change indication. When a series of holes of the same size are to be drilled, counter-bored or reamed, the cycle is fully automatic, freeing the operator for other work. At each different hole size the cycle stops automatically and a "tool change required" signal light goes on. After change is made, hole is automatically positioned and drilled at correct feed and speed.

Available with "ACRAMATIC" punched tape control by Cincinnati Milling Machine Co., the Healdrill permits simple, direct programming of all functions — tape reading rate of 1200 lines per minute — full range zero shift on both axes — repeatability of ± .0002" — accuracy of positioning to ± .001" — and complete manual control from the console when tape is not used.



SPECIFICATIONS

Table Size	24" x 56"
Longitudinal Table Travel	48"
Transverse Table Travel	20"
Vertical Range	0-30"
Spindle Speed Range	30-1800 rpm in 16 steps
Feed Range	.002"-.030" per rev. in 8 steps

SHOWN IN ACTION in Booth 924 at The Machine Tool Exposition. Write to Heald for additional information.

it PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

MMT-PE

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse

HEALD

SEPTEMBER 1960
Vol. 67 No. 1

MACHINE TOOL EXPOSITION NUMBER

Machinery

THE MONTHLY MAGAZINE OF ENGINEERING AND PRODUCTION IN THE MANUFACTURE OF METAL PRODUCTS

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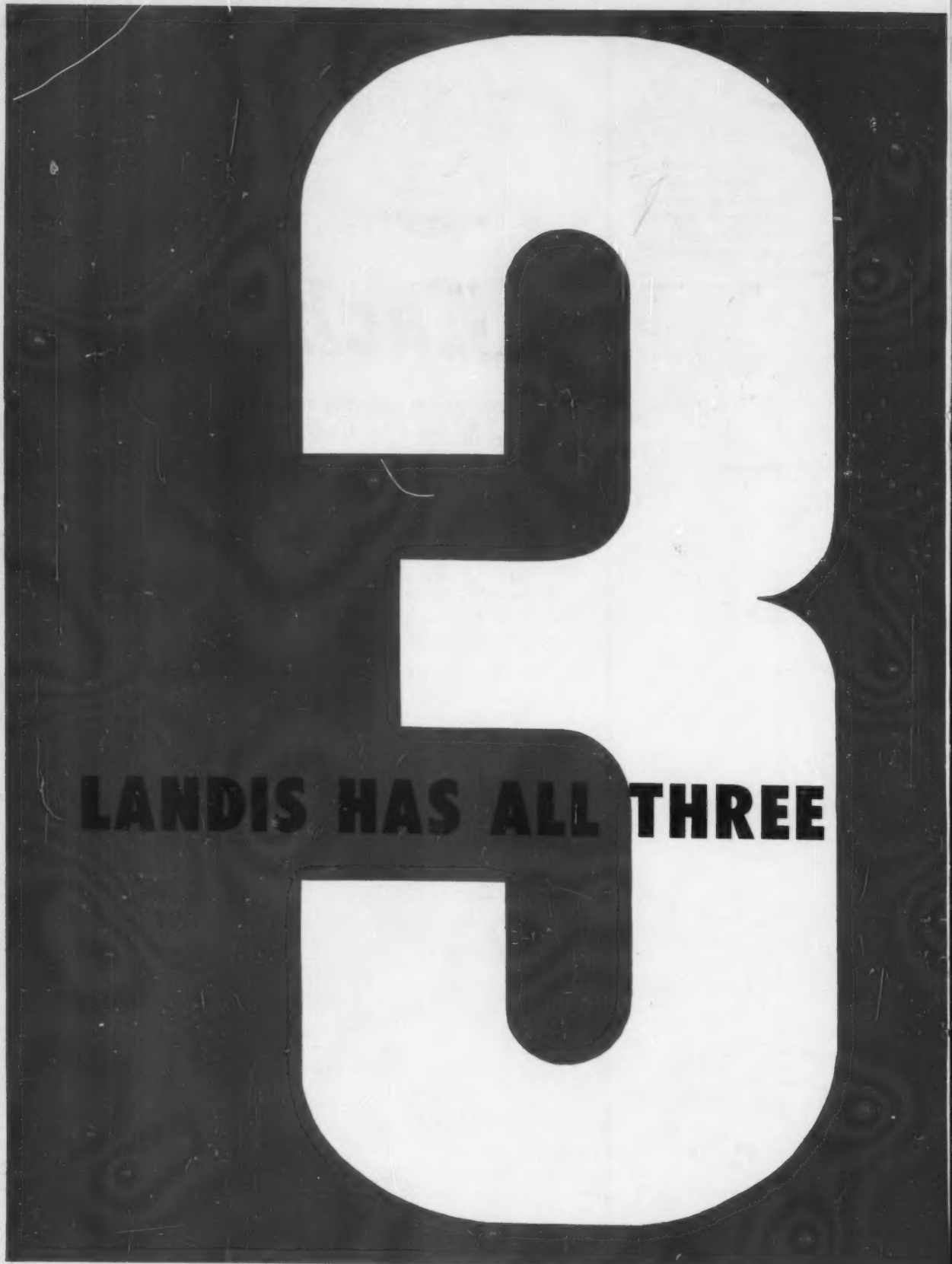
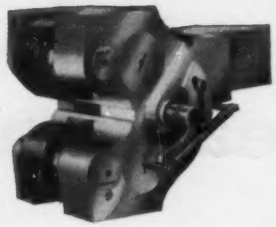
15, Rue Bleue, Paris-IX°, France


3
LANDIS HAS ALL THREE

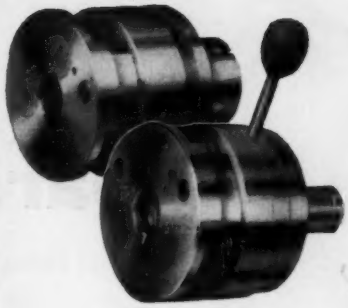
THREAD ROLLING MACHINES

. . . produce strong, accurate threads of excellent finish by the chipless, cold-forming process . . . produce left- and right-hand threads of all types (except square), including UNC, UNF, Acme, worm, and many special forms.



THREAD ROLLING ATTACHMENTS

. . . produce either straight or tapered threads . . . exclusive features include: tipping to avoid indexing interference . . . simple design allows disengaging attachment without disturbing set-up . . . and a gage determines precise position where vertical centerlines of both rolls and workpiece coincide.



THREAD ROLLING HEADS

. . . produce Class 4 threads of excellent finish at high speeds . . . feature replaceable helix angle bushings which allows rolling threads with exact helix angles without purchasing major head components.

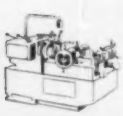
Whatever your Thread Rolling requirement, there is a LANDIS machine or tool to do the job. Our detailed knowledge of the most efficient application of the different methods of thread rolling—and our more than 50 years experience in the threading field—has resulted in our producing a complete line of thread rolling equipment. Make LANDIS your one-stop source for all your thread rolling needs. When inquiring about Thread Rolling, describe your operation and send specifications.

LANDIS *Machine* COMPANY

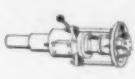
THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT

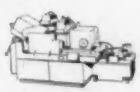
WAYNESBORO
PENNSYLVANIA

MMT-PE
BOOTH NO. 432
550C


Threading Machines

Die Heads—Rotary & Stationary


Taps—Collapsible & Solid Adjustable


Centerless Thread Grinding Machines

Thread Rolling Tools

Thread Rolling Machines

For more data circle this page number on card at back of book

gear headquarters at the

MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY

BOOTH 929

SHAPE
No. 4GS Fellows Gear Shaper

HOB
P.400 Fellows — Pfauter Hobber

FINISH
No. 4BGS Fellows Gear Finisher

NMTBA EXPOSITION

If you use gears (and who doesn't?) you'll want to look in at the Fellows booth to see the latest in gear production equipment.

If you produce your own gears, you'll want to make booth 929 your first stop.

Here you'll see an array of manual and automated machines designed to handle almost any spur or helical job, right from the blank to the finished gear. You'll see the famous Fellows Gear Shaper, as well as other Fellows machines for hobbing, finishing, grinding and inspecting, and a machine for sharpening helical gear shaper cutters.

Remember the booth number: 929. Trained Fellows specialists will be on hand to explain the machines and to answer any questions you may have.

GRIND
No. 12 Fellows — Reishauer Gear Grinder

INSPECT
No. 4 Fine-Pitch Red Liner

SHARPEN
No. 6SA Helical Cutter Sharpener

THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont, U.S.A.

Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N.J.
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THE PRECISION LINE

Fellows

Gear Production Equipment

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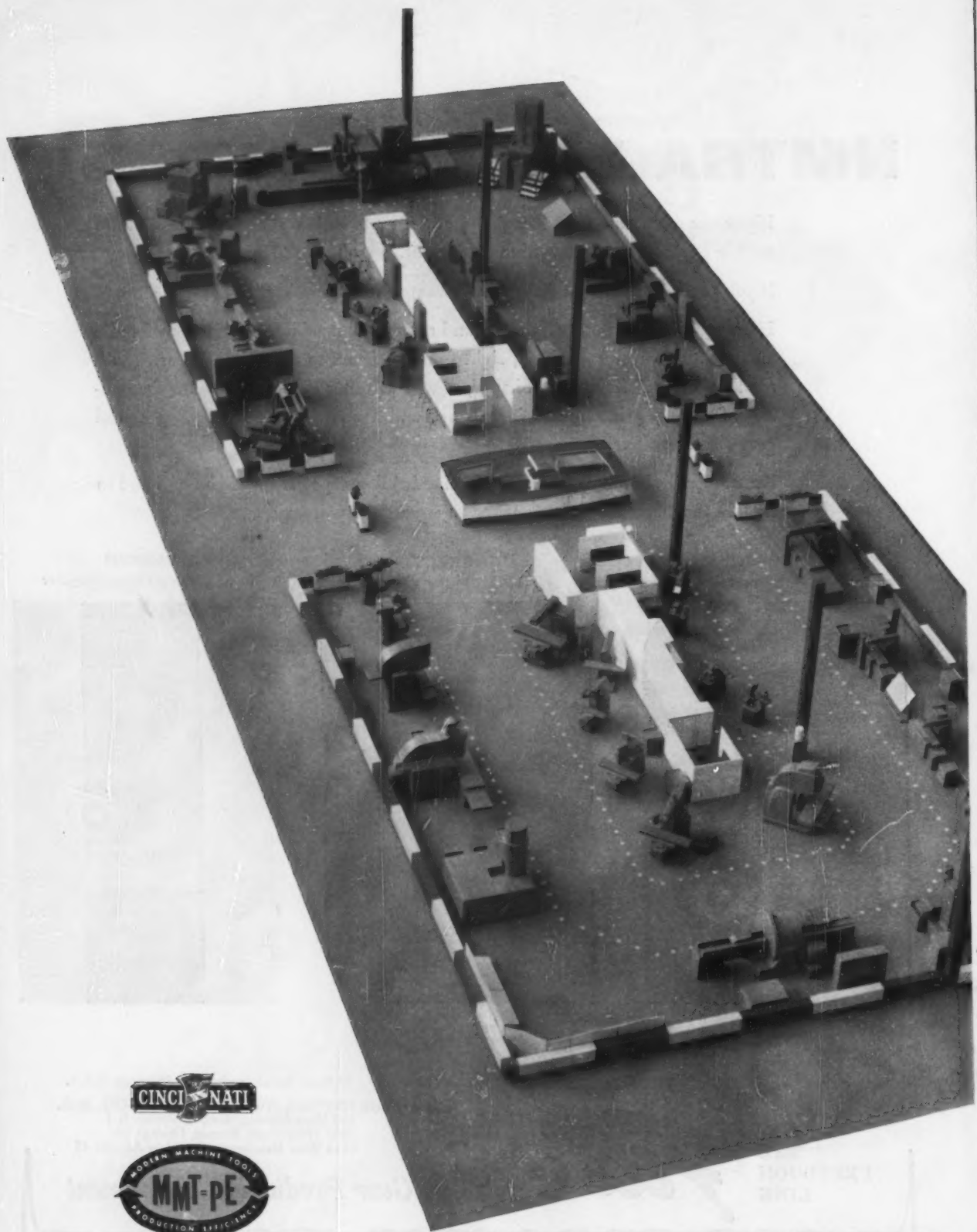
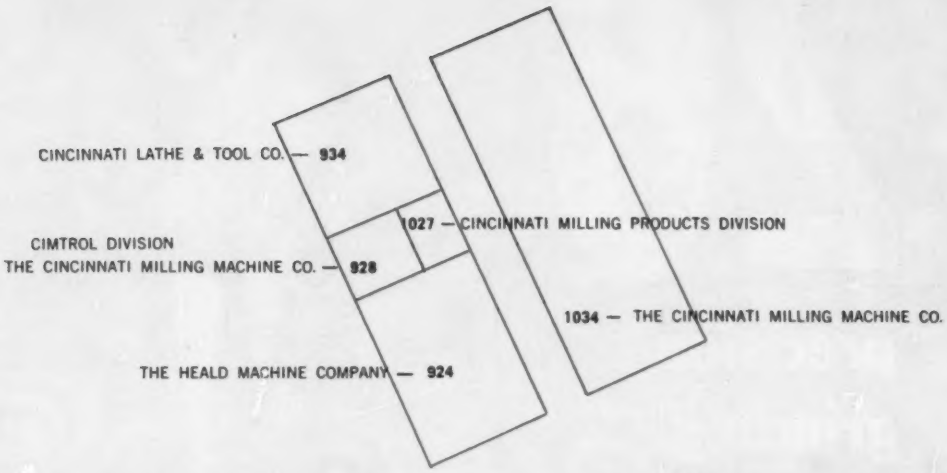


CINCINNATI

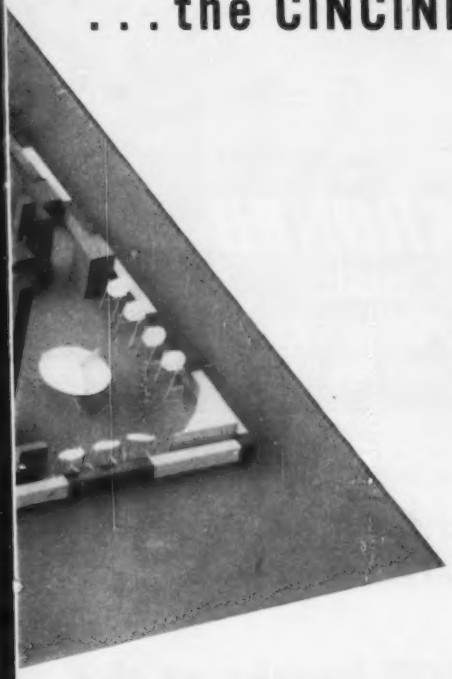
MODERN MACHINE TOOLS MMT=PE PRODUCTION EFFICIENCY

THE CINCINNATI MILLING MACHINE CO.,


CINCINNATI LATHE & TOOL CO. — 934
1027 — CINCINNATI MILLING PRODUCTS DIVISION
CIMTROL DIVISION
THE CINCINNATI MILLING MACHINE CO. — 928
1034 — THE CINCINNATI MILLING MACHINE CO.
THE HEALD MACHINE COMPANY — 924

The Most Rewarding Visit in Your Exposition Tour

. . . the CINCINNATI MILLING Family of Exhibits



"Addresses" worth remembering: 1034, 1027, 934, 928, 924. They're the Machine Tool Exposition "addresses" of The Cincinnati Milling Machine Co., its Divisions and associate Companies. In these contiguous display areas you will see the finest array of machine tools and complementary equipment ever assembled for public inspection. In area 1034 you will find equipment for many types of advanced metalworking manufacturing:

• Production and Toolroom Milling • Numerically Controlled Machines • Die Sinking • Cutter Grinding • Surface Broaching • Centertype and Centerless Grinding, including Super Precision • Micro-Centric Grinding • Electrical Machining • Metal Forming • Automatic Control and Gaging Equipment • Special and Automated Machines

There are 35 Cincinnati machines of the foregoing types, all operating, all offering new ideas and new opportunities to reduce costs. And right across the aisle is another area of almost equal size, containing operating exhibits of two Cincinnati Milling Divisions and two associate Companies. These Cincinnati exhibits reveal the finest in metalworking progress. Be sure to reserve plenty of time for a thorough inspection of all of them.

CINCINNATI 9, OHIO

CINCINNATI®

For more data circle this page number on card at back of book

26

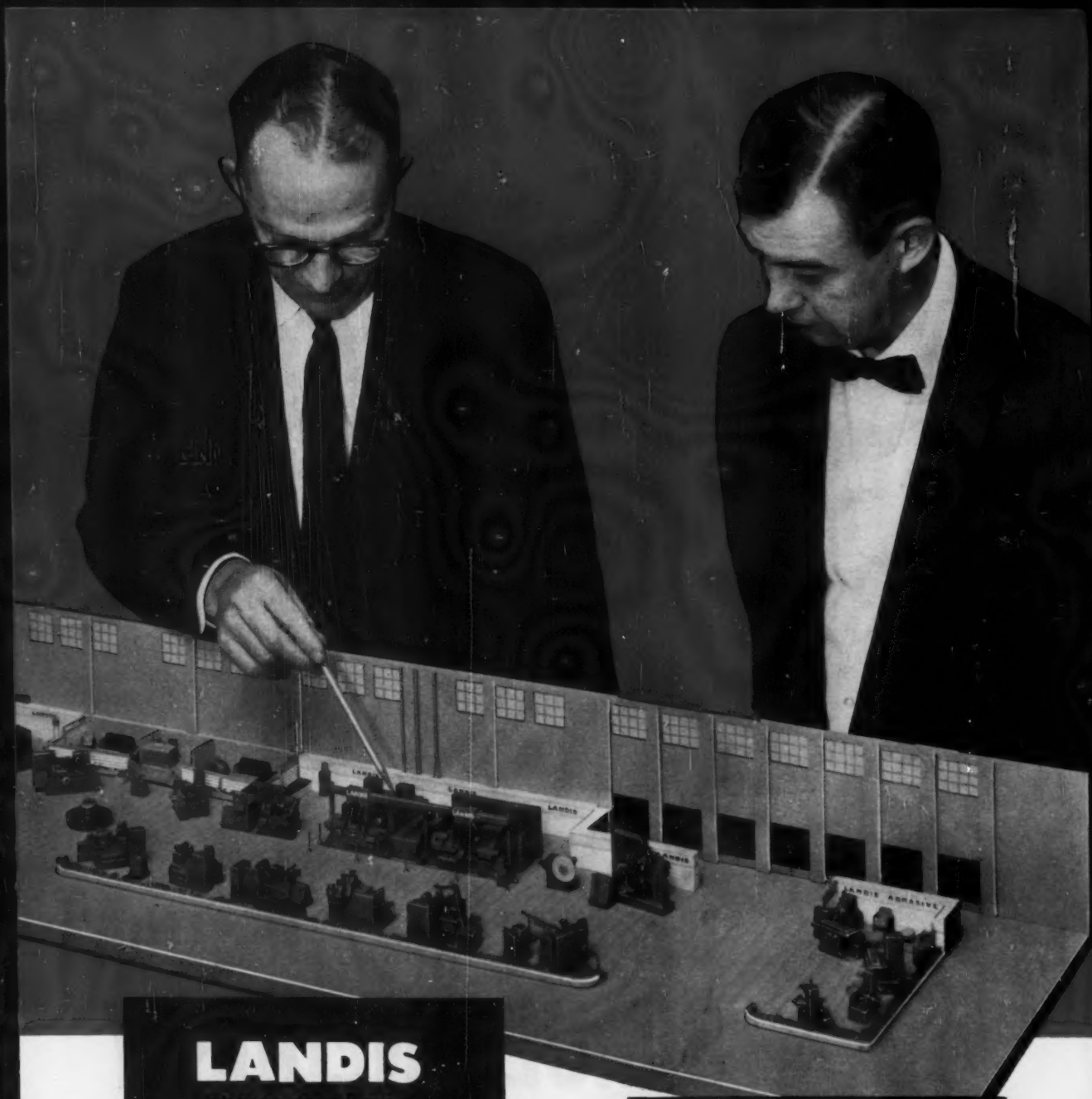
precision grinding machines

cylindrical
disc
surface

with all the newest ideas in precision grinding

GARDNER
DISC GRINDERS
Booth No. 811

see them at the LANDIS and GARDNER booths at the

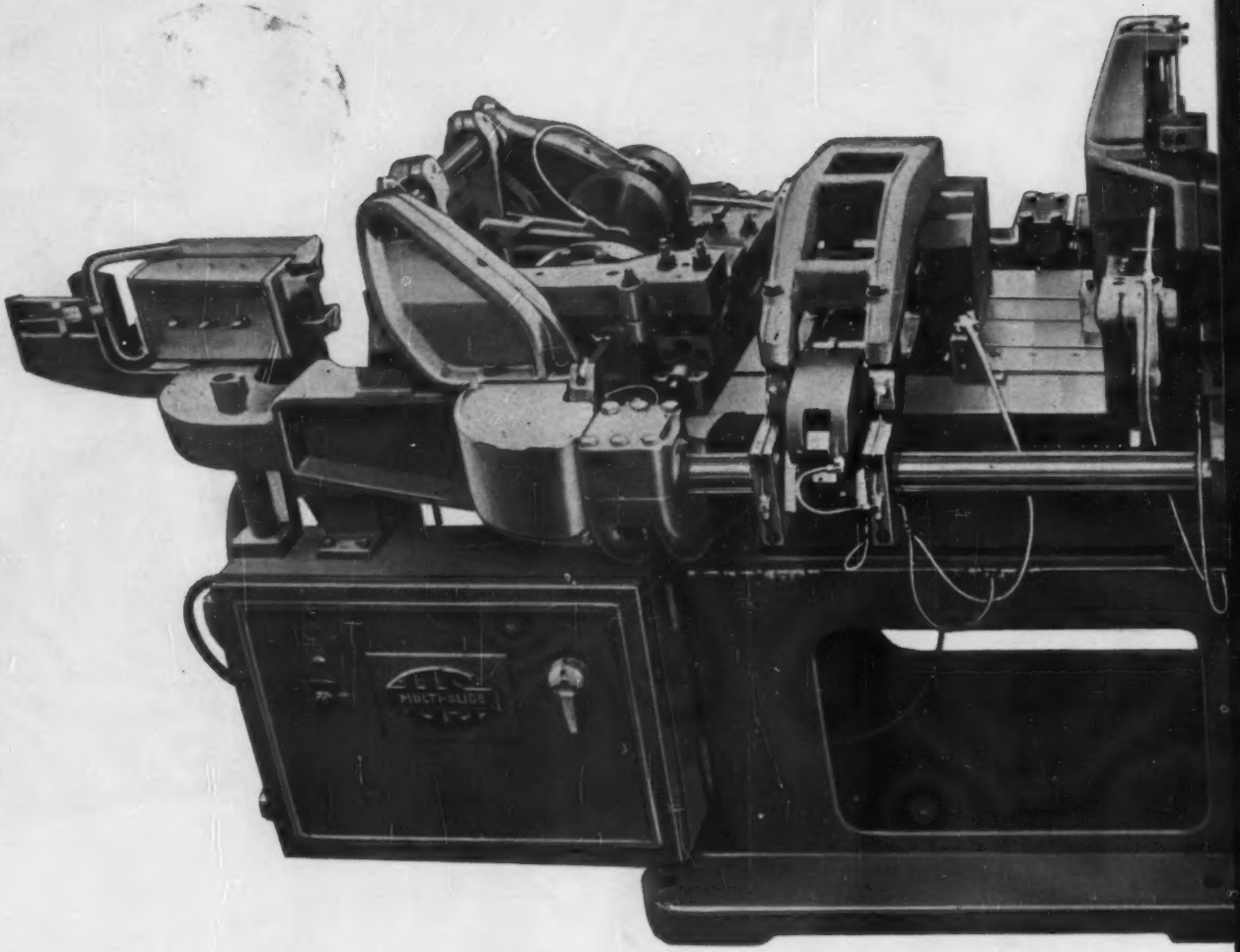


LANDIS
CYLINDRICAL GRINDERS
Booth No. 823

LANDIS
ABRASIVE SURFACE GRINDERS
Booth No. 825

MACHINE TOOL EXPOSITION

LANDIS TOOL COMPANY, WAYNESBORO, PENNSYLVANIA
GARDNER MACHINE COMPANY, BELOIT, WISCONSIN

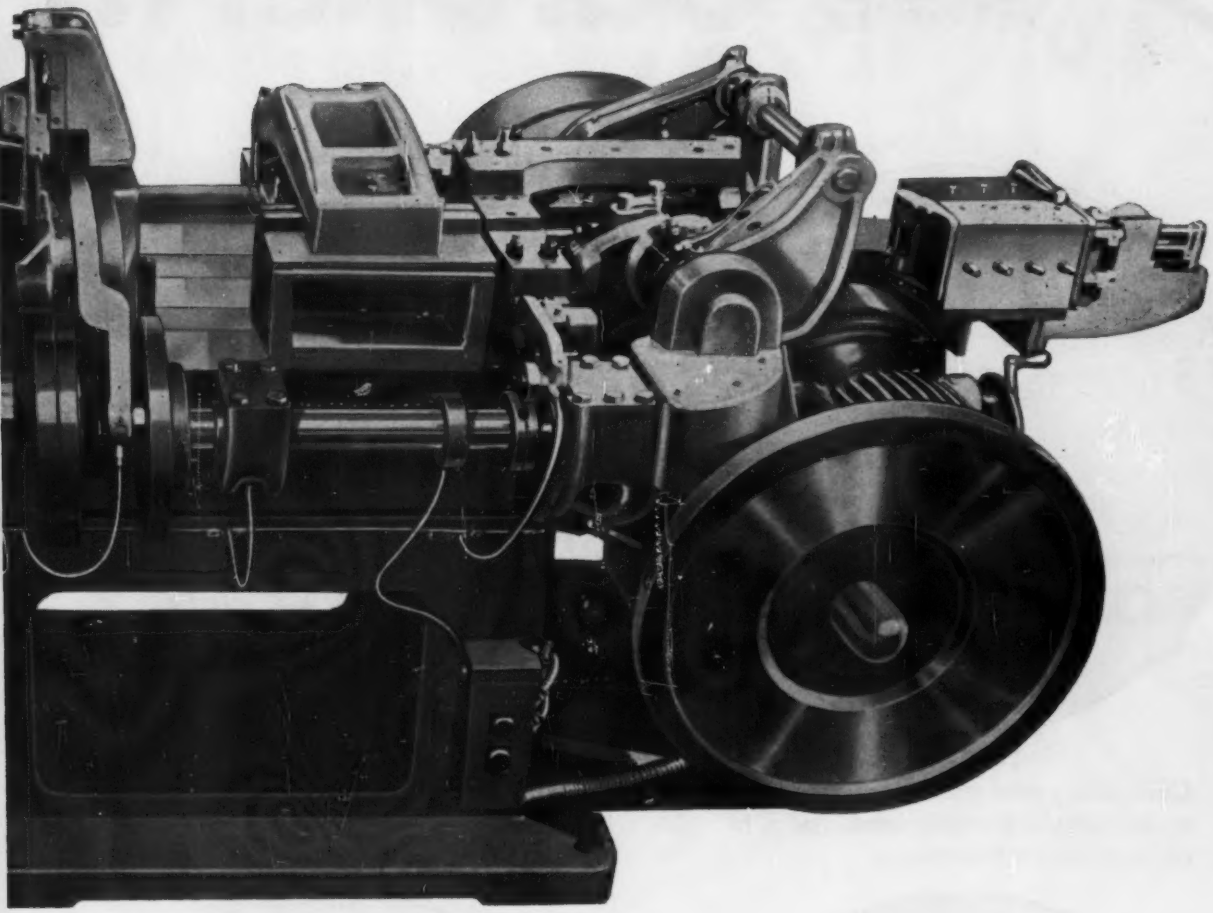


U.S. DUPLEX MULTI-SLIDE®

SIMULTANEOUSLY

FEEDS AT BOTH ENDS & PRODUCES TWO OR MORE STAMPINGS & FORMS & ASSEMBLES

The new U.S. Duplex Multi-Slide is a double ended machine which more than doubles previous production potentials.



With the U. S. Duplex you can ■ Produce and assemble 2 different stampings from the same or dissimilar materials. ■ Produce and assemble 2 complementary stampings. ■ Produce stampings from one end, wire form from the other end and assemble. ■ Produce 2 stampings and assemble with hopper-fed, prefabricated parts. ■ Make 3 piece assemblies, feeding material from both ends — and from the top. ■ Make 2 or more identical or different stampings not requiring assembly — and of the same or different material. ■ And, can be operated as a conventional Multi-Slide by feeding material into one end only. **Standard U.S. Duplex Multi-Slide equipment includes a feed, stock straightener, check and ram action at each end and a common 4-slide forming position with double, vertical strippers at the center. Material up to 3" wide can be fed into both ends of machine simultaneously. Feed length is adjustable up to a maximum of 6" and can differ from each end of the machine. Investigate the economies a U.S. Duplex Multi-Slide can give you. A few of these are: elimination of secondary operations; savings in floor space; ease of inspection of finished assemblies; and fewer rejects . . . all through the versatility of the "Duplex".**

Write today for full information and specifications. Send us your samples or drawings today and let us show you.

MMT·PE

MULTI-SLIDE

See the U. S. Duplex Multi-Slide in Booth No. 842 at the 1960 Machine Tool Exposition.

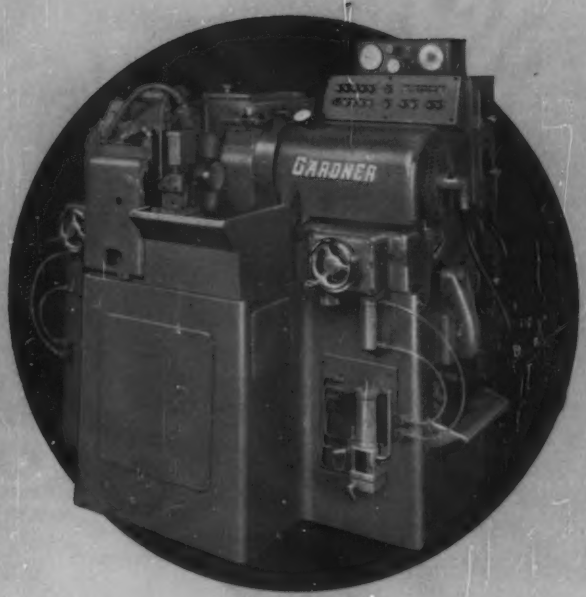
U.S. TOOL COMPANY, INC.

AMPERE (East Orange) NEW JERSEY

U. S. Multi-Slides® • U. S. Multi-Millers® • U. S. Automatic Press Room Equipment • U. S. Die Sets and Accessories

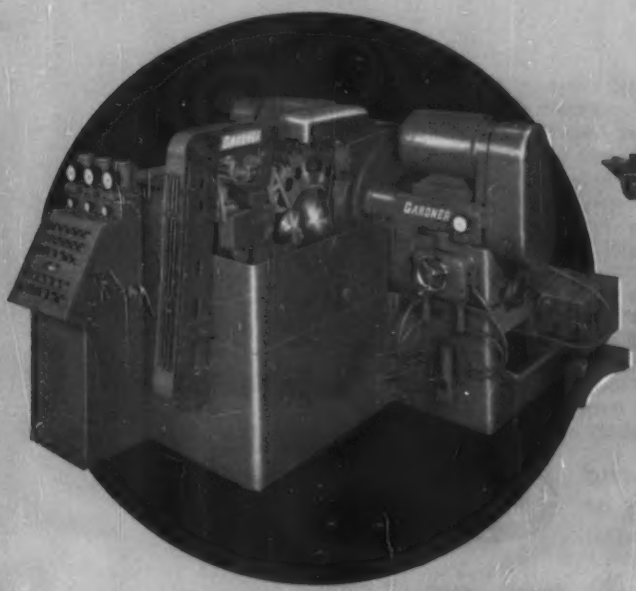
For more data circle this page number on card at back of book

see Gardner...

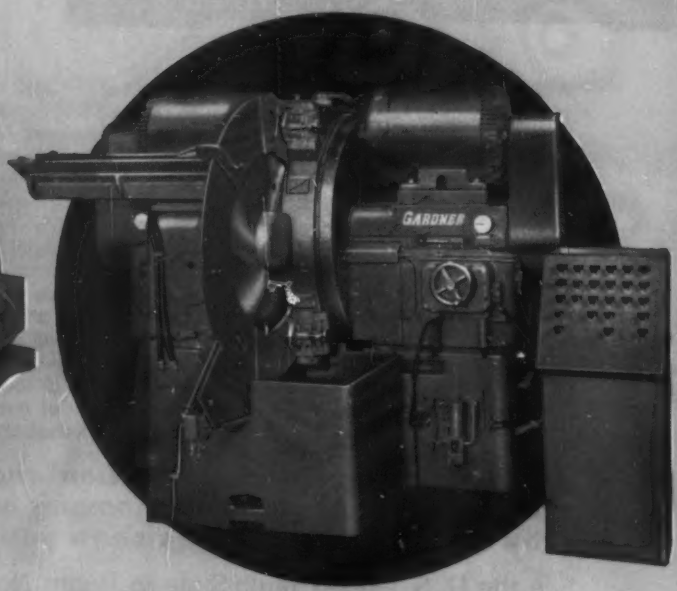


2H10–15"
Completely new machine grinds sides of instrument bearing inner races to ultra-precision tolerances.

2H20–23"
Grinds both ends of 15,000 bearing rollers per hour. Completely automated—loading, grinding, unloading.



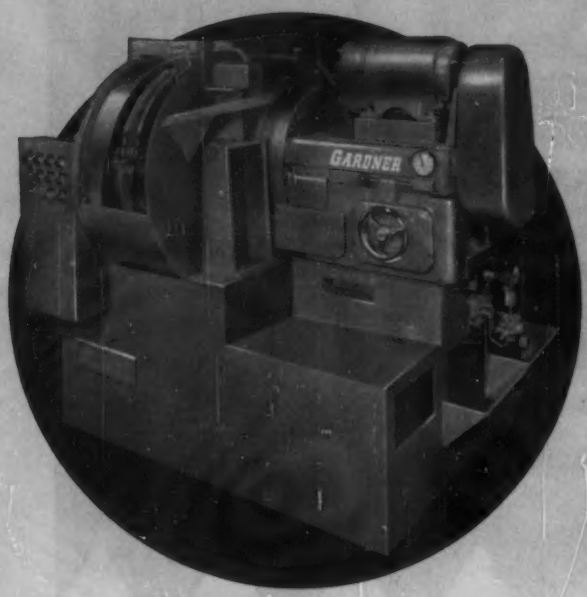
2H30–30"
Complete automated grinding of universal joint spiders including dressing and mechanical work indexing.



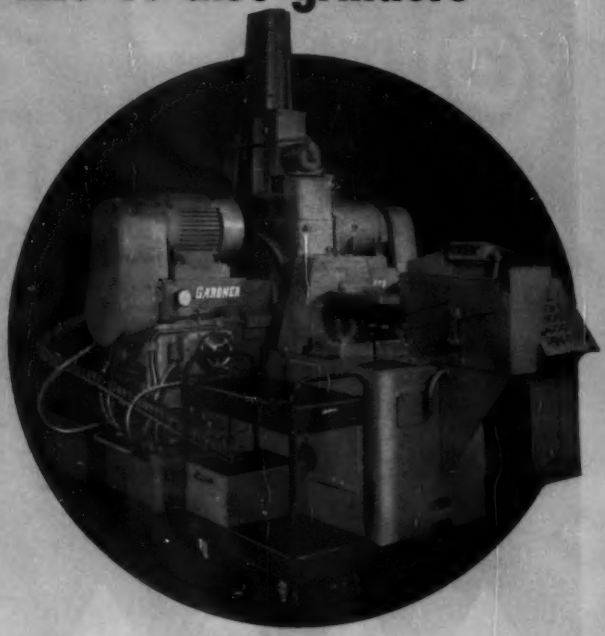
2H40–42"
Unequal areas of parallel sides of large, thin aluminum workpieces ground in rotary work carrier.

booth 811 .....MACHINE TOOL EXPOSITION

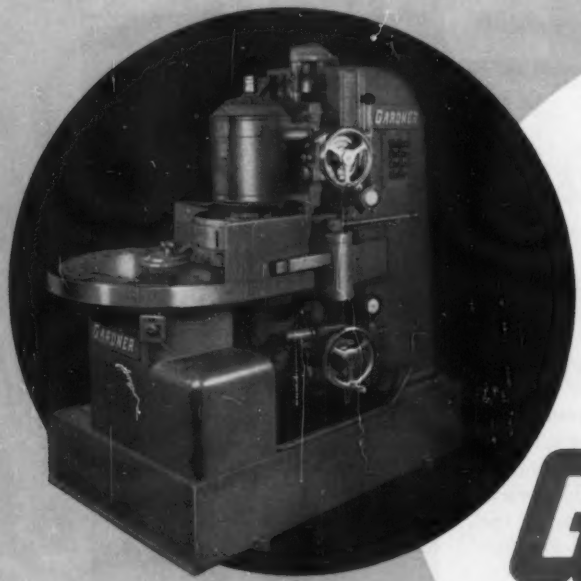
the newest developments in disc grinding
the world's most complete line of disc grinders



1H20–23"
Completely new single spindle grinder with automatic work handling and in-process gauging. Grinds valve ends.



2H30–30"
Grinds bi-metallic thrust washer to flatness and parallelism of .0005". Features new shake-free ball dresser.



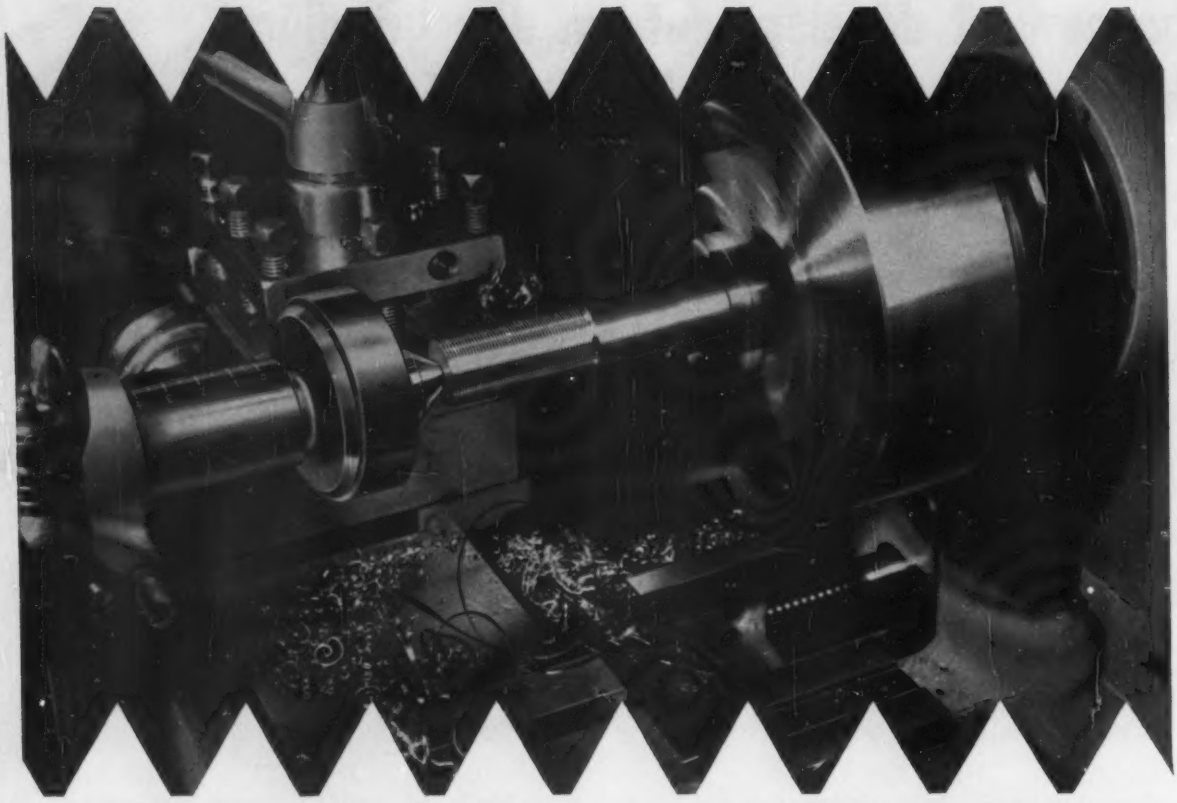
2V18–18"
Grinds both sides of small gears, in one operation, to .0003" flat and parallel.

new designs
new features
new methods

GARDNER

precision disc grinders
abrasive discs

BELOIT, WISCONSIN



Now . . . cut threads 5 times faster with Clausing geared-head lathes

The Clausing-Colchester 13″, 15″, 17″ geared-head lathes equipped with new high speed thread cutting unit—

(1) Cut threads five times faster than by normal methods

(2) Thread tight to a shoulder at maximum speed

(3) Cut internal threads without undercutting

(4) Take full advantage of carbide tools

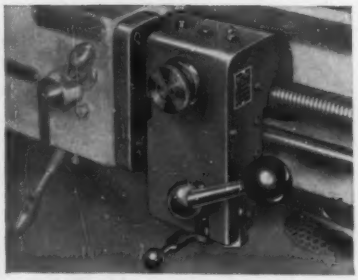
(5) Minimize rejects

(6) Unit does not restrict normal use of the machine

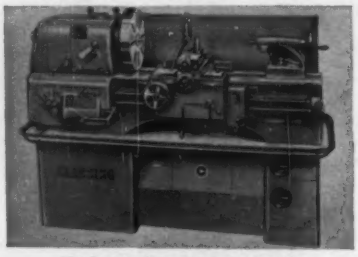
Cutting a 1⅛″—16 thread . . . at 1200 RPM . . . is an example of the production obtained with this unit on a Clausing lathe. And you cut precision threads every time! The Hi-Speed Unit contains its own half-nuts and engagement mechanism that eliminates all danger of a thread being "picked up" incorrectly. The tool can't run into the work or chuck—an adjustable stop disengages the half-nuts automatically at the end of the thread.

Clausing geared-head lathes are bigger in capacity. Have larger spindles, larger thru-hole capacity, larger bearings for heavier work. Geared-head is powered thru multiple V-belts. See for yourself the many *plus* features you get in Clausing lathes equipped for high speed thread cutting.

See This and Other Clausing Machine Tool Advancements at the COLISEUM MACHINERY SHOW in Chicago



Operation of the thread cutting unit is simple and fool proof. There's no revolving dial to watch—no manual coordination to require slow speeds.



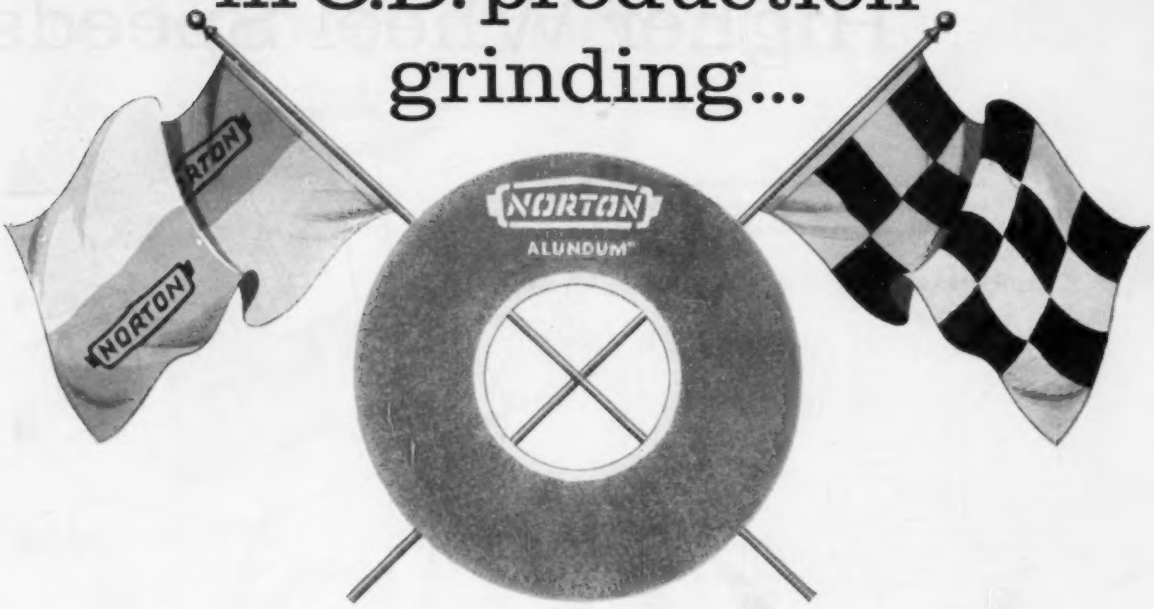
15″ Clausing-Colchester lathe with high speed thread cutting unit . . . only $3,626.

CLAUSING

CLAUSING DIVISION
ATLAS PRESS COMPANY
9-110 N. PITCHER ST. • KALAMAZOO, MICHIGAN

BIG NEWS

in O.D. production grinding...



You Can Now Get Norton Grinders With

HIGHER WHEEL SPEED

SEE THEM AT THE SHOW

Watch Norton Grinders Running at 8500 SFPM!

Learn how their greatly stepped-up speed
brings you new production benefits...

NORTON

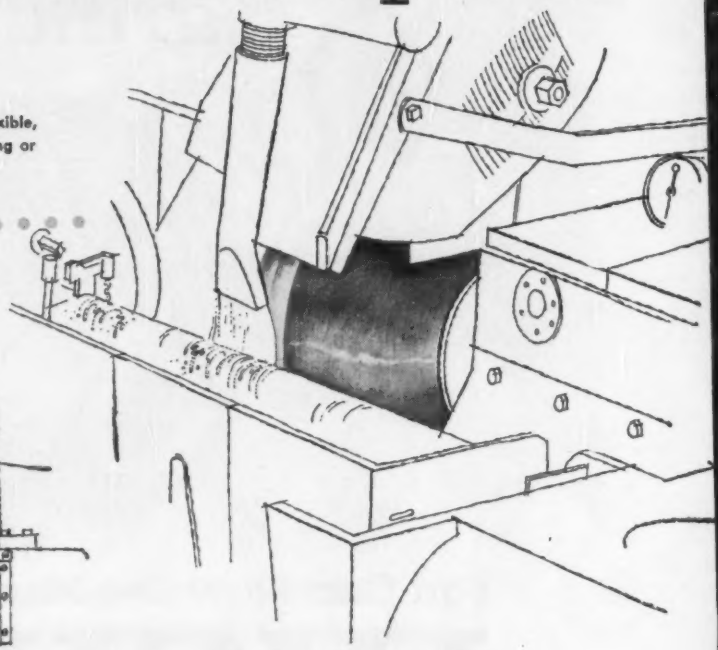
Booth No. 651.
At the 1960 NMTBA Show

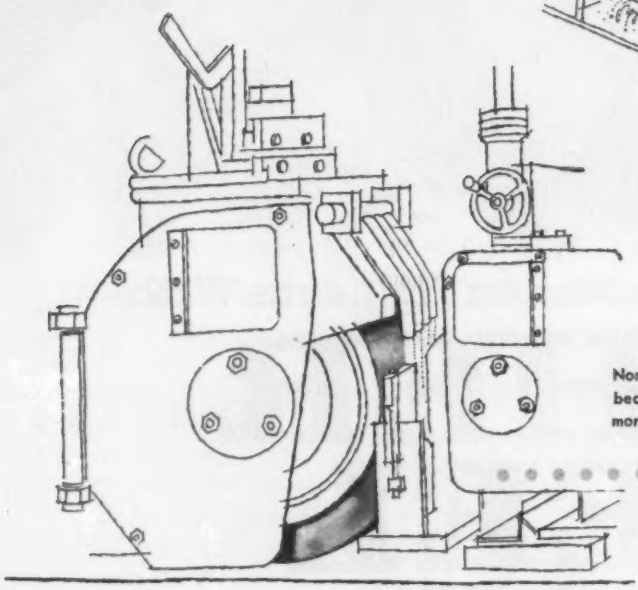
For more data circle this page number on card at back of book

Announcing:

Higher Wheel Speeds

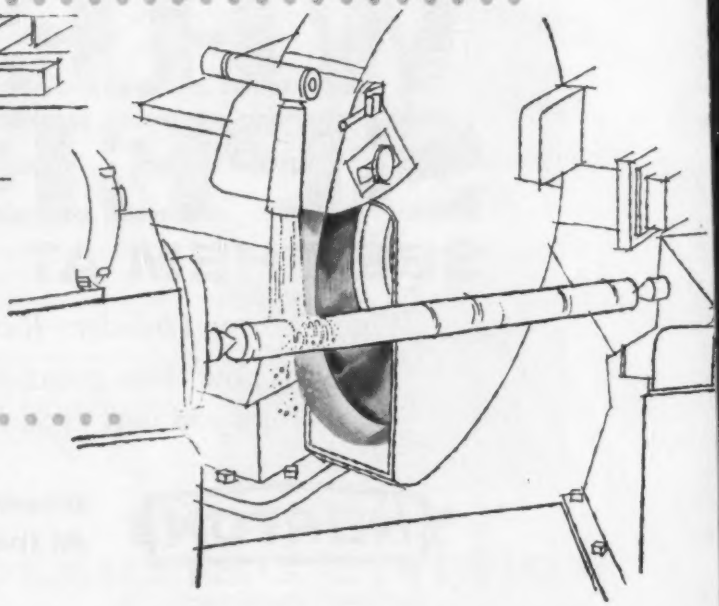
Norton Type CTU cylindrical grinders are fast, flexible, accurate. For single wheel or multi-wheels, roughing or finer finish, plunge or traverse type operations.





Norton No. 2 centerless grinder is outstanding for its straddle-bearing support of grinding and regulating wheels for faster, more consistent sizing.

Norton Type CP-1 PLUNGE-O-MATIC grinder designed solely for automatic plunge grinding, assures low unit cost production through fast, steadily paced action.



NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEAR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

to Speed Production

Norton grinders with Norton grinding wheels at 8500 SFPM grind faster and better, with more savings than ever before.

Norton comes up with this latest advancement only after exhaustive testing of Norton machines and Norton wheels at the new higher speeds.

In test after test Norton machine-wheel teams proved their ability to grind at 8500 SFPM — *not only with safety, but with more advantages than were ever obtained under the previous limitation of 6500 SFPM.*

That's why important Norton cylindrical production grinders — Type CTU, plus the No. 2 Centerless, plus Type CP-1 PLUNGE-O-MATIC® — are now available with wheel speed ranges stepped up to 8500 SFPM.

New Norton High-Speed Production Benefits

Higher Productivity. Increasing SFPM by 30% reduces grinding time by about one-third and increases pieces-per-hour.

Finer Surface Finish. On most cylindrical jobs, the new higher wheel speed means a finer finish. On Norton machines this advantage is now available to you.

Longer Wheel Life. 8500 SFPM cuts down number of wheel dressings needed thereby increasing the production life of the wheel.

Lower Wheel Cost. Longer wheel life means more pieces-per-wheel, longer wheel use per dollar and thus lower operating cost per wheel.

From now on Norton grinders arranged for the new maximum of 8500 SFPM will be so identified by an attached plate. Norton grinding wheels of the types approved and specially tested for the higher operating speed will also be identified to show this approval. For details on how Norton wheels and machines can bring the new high speed advantages to your production — *fast!* — call your Norton Man, a trained Grinding Engineer. Or write to NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. *District Offices:* Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

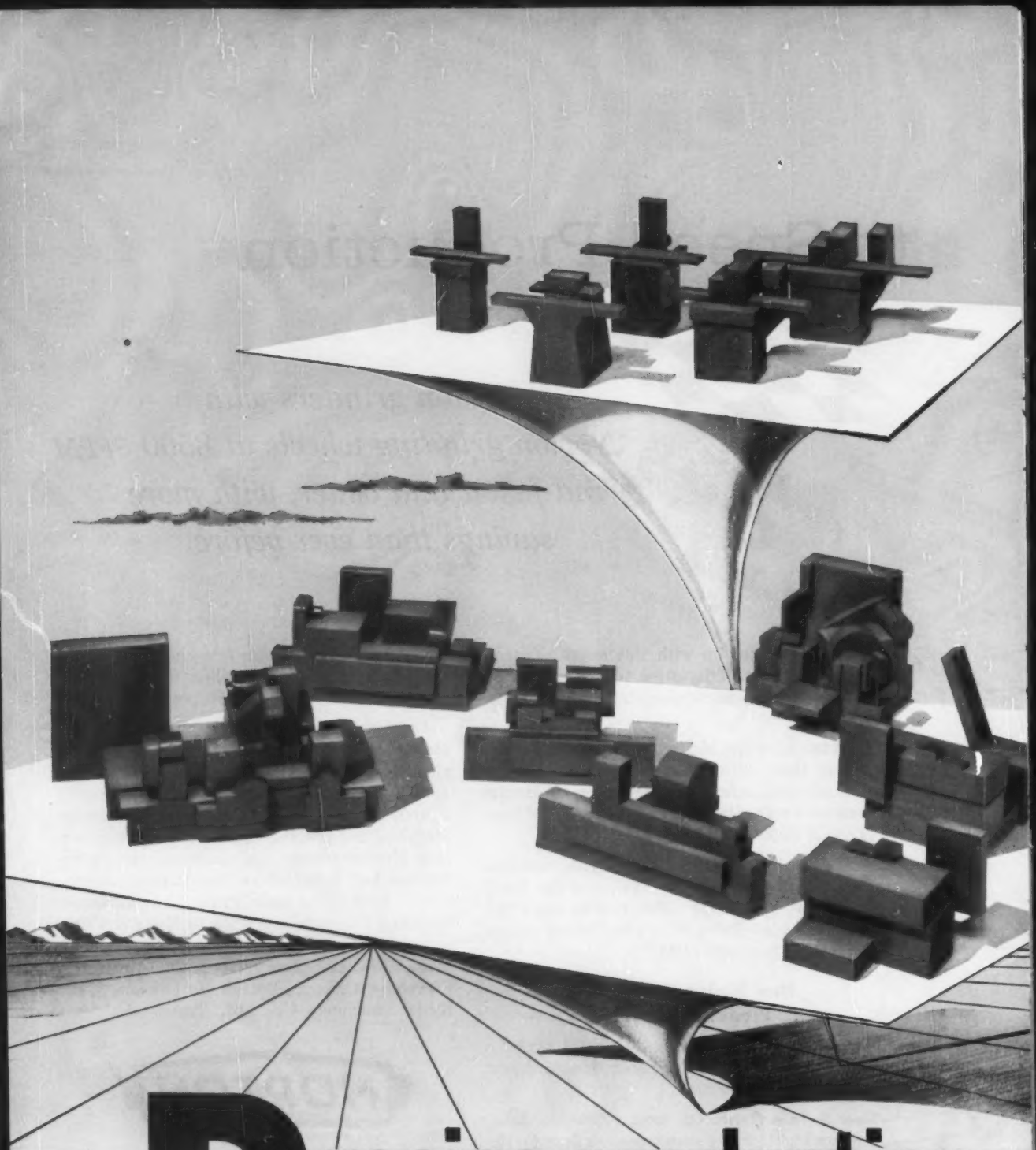
NORTON

75 years of . . .

Making better products... to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — G & E DIVISION: Shapers • Gear Cutting Machines • Gear Induction Hardeners

For more data circle this page number on card at back of book



Precise production

See these new Norton Machines *in action* in Booth No. 651!

A *new* MULTI-WHEEL Grinder grinding main bearings . . . the *new* CC-8 CRANK-O-MATIC with automatic table indexing for crankpins . . . and the new No. 31 CRANK-O-LAP lapping all bearings and pins at one time . . . *all* on a three-machine transfer line.

See S-3 Hydraulic Surface Grinders running at **150 FPM** *for the first time.* The most efficient 15 H.P. cylindrical grinder, the PLUNGE-O-MATIC . . . a new Cutter and Tool Grinder with tilting wheel head for fastest set-ups on toughest jobs . . . and two brand-new Hand Surface Grinders with outstanding sizing and finishing ability.

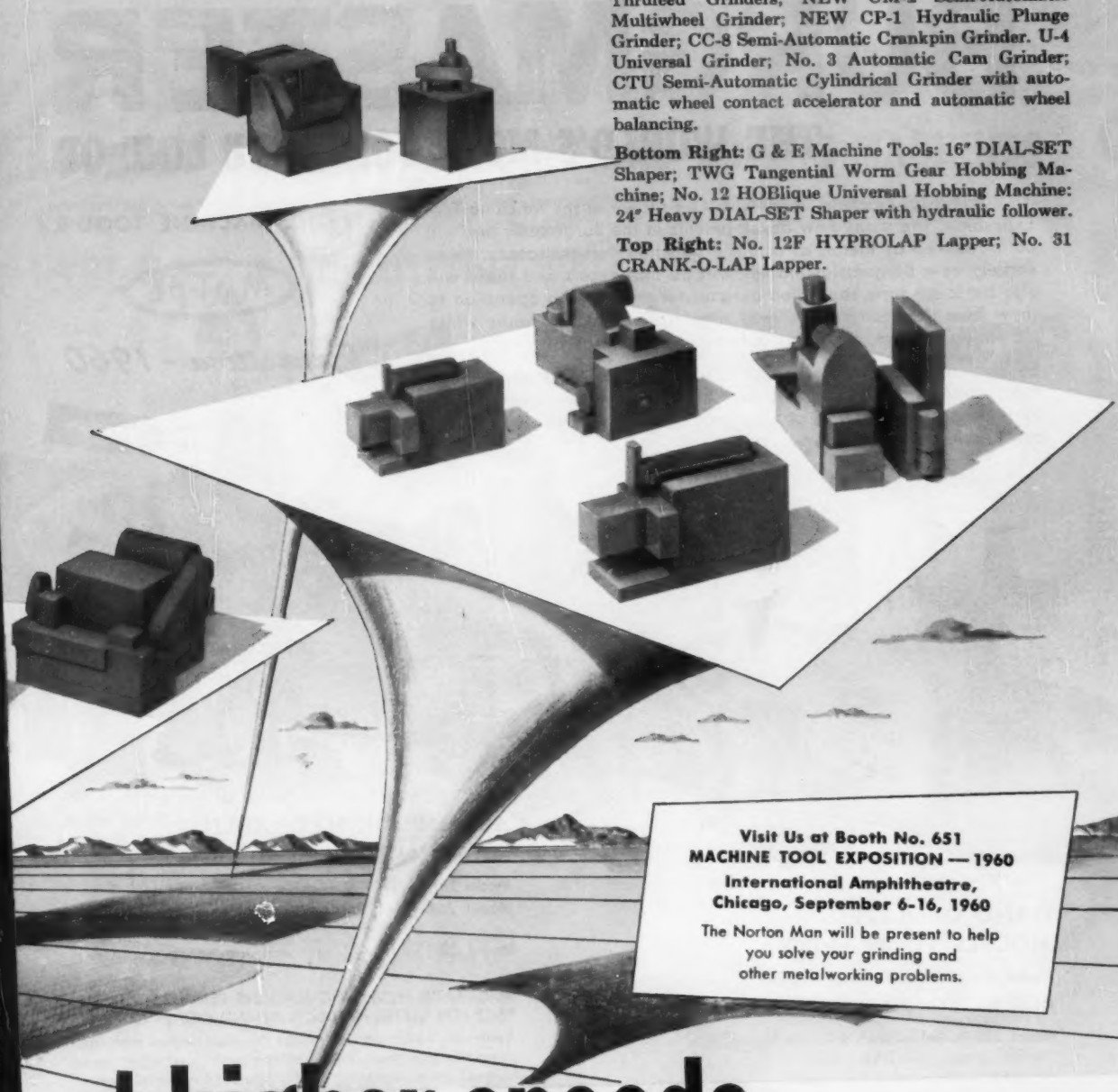
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals • BEHR-MANNING DIVISION:

Top Left: NEW No. 200 Cutter and Tool Grinder; NEW 6 and 10" Type TS Hand Surface Grinders; NEW 6 and 8" S-3 Hydraulic Surface Grinders.

Bottom Left: NEW No. 2 Centerless Plunge and Thrufeed Grinders; NEW CM-2 Semi-Automatic Multiwheel Grinder; NEW CP-1 Hydraulic Plunge Grinder; CC-8 Semi-Automatic Crankpin Grinder. U-4 Universal Grinder; No. 3 Automatic Cam Grinder; CTU Semi-Automatic Cylindrical Grinder with automatic wheel contact accelerator and automatic wheel balancing.

Bottom Right: G & E Machine Tools: 16" DIAL-SET Shaper; TWG Tangential Worm Gear Hobbing Machine; No. 12 HOBlique Universal Hobbing Machine: 24" Heavy DIAL-SET Shaper with hydraulic follower.

Top Right: No. 12F HYPROLAP Lapper; No. 31 CRANK-O-LAP Lapper.



Visit Us at Booth No. 651
MACHINE TOOL EXPOSITION — 1960
International Amphitheatre,
Chicago, September 6-16, 1960

The Norton Man will be present to help you solve your grinding and other metalworking problems.

at higher speeds

Plus other Norton exclusives like . . . *Automatic Wheel Contact Accelerator* to shorten grinding cycle and save dollars. *Ultra-Precise Wheel Balancing* in just five seconds! Automatic Face & Radial Truing device that perfectly blends face and radii, *without machining lines.*

AND THESE G & E MACHINES: 1. Two new DIAL-SET Shapers — *real time savers!* 2. New HOBlique Hi-Speed Gear Hobber — eliminates need for feed and lead change gears, lead screw, and differential.

In short, see how *you* can speed up your precision production. NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. *District Offices:* Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

NORTON
MACHINE TOOLS

75 years of . . .
making better products... to make your products better

Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes • MACHINE TOOL DIVISION: Grinding and Lapping Machines — G&E DIVISION: Shapers • Gear Cutting Machines • Gear Induction Hardeners

BURGMASTER

THE WORLD'S MOST COMPLETE LINE OF

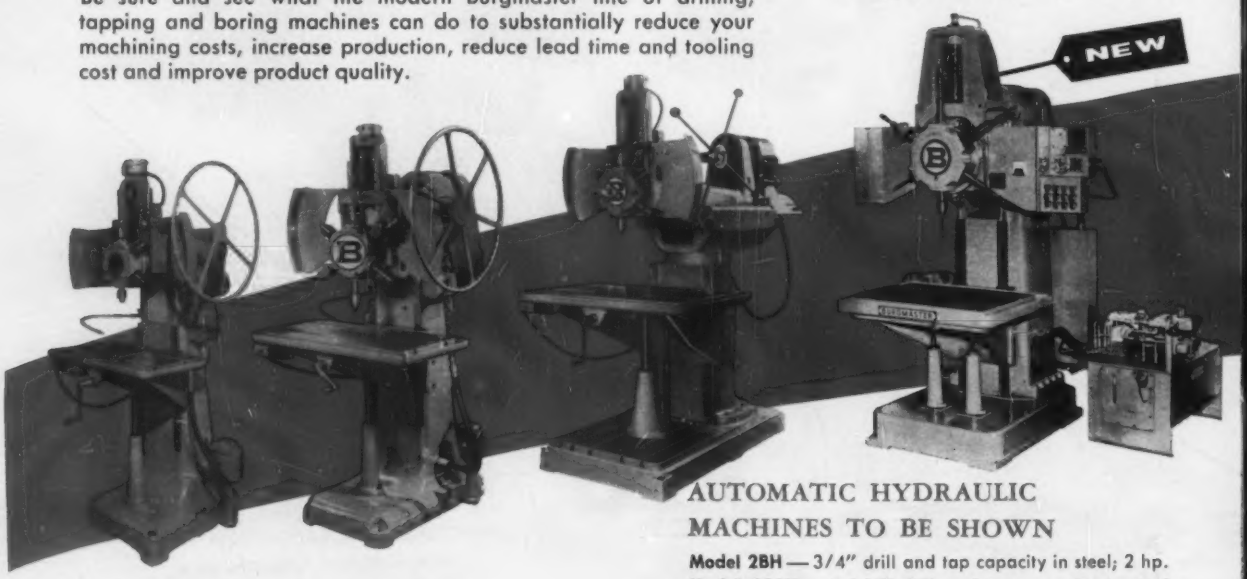
13 Burgmaster machine models will be shown at the Machine Tool Exposition. The many new developments in the Burgmaster line will be introduced by means of actual production demonstratons. Three entirely new Burgmaster models will be introduced and there will also be seven tape controlled Burgmaster machines in operation to show how you can reduce lead time from weeks to hours while increasing production by fully automatic machining.

Be sure and see what the modern Burgmaster line of drilling, tapping and boring machines can do to substantially reduce your machining costs, increase production, reduce lead time and tooling cost and improve product quality.

THE MACHINE TOOL

MMT-PE

Exposition - 1960



HAND OPERATED MODELS TO BE SHOWN

Model 1C—1/2" drill and tap capacity in cast iron; 1 hp.

Model 2B—3/4" drill and tap capacity in steel; 2 hp.

Model 2BR Radial—3/4" drill and tap capacity in steel; 2 hp.

HOW HAND OPERATED BURGMASTER TURRET DRILLS INCREASE PRODUCTION

Fast power turret indexing to perform a sequence of machining operations; Preselective spindle speeds — automatically changed for each spindle; Precision depth control; Quick setup — ideal for short run work.

See the new Burgmaster Lead Screw Tapping Head in action. This attachment greatly improves the accuracy and finish of tapped threads and eliminates scrap due to pulled or loose threads.

AUTOMATIC HYDRAULIC MACHINES TO BE SHOWN

Model 2BH — 3/4" drill and tap capacity in steel; 2 hp.

Model 25AH — 1-1/4" drill and tap capacity in steel; 7-1/2 hp.

Model 3BH — 1-1/2" drill and tap capacity in steel; 10 hp.

AUTOMATIC HYDRAULIC MACHINE FEATURES SET THE PACE FOR FASTER PRODUCTION AND HIGHER QUALITY

Automatic operation determines the pace — one man can operate more than one machine with less effort and fatigue, while increasing production; Simple controls mean faster setups ideal for short run work; Pre-selective infinitely variable spindle feeds, pre-selective spindle speeds and pre-selective depth control.

NEW IMPROVED FEATURES

- Temperature and pressure compensated hydraulic feed — infinitely variable.
- Direct reading rate of feed indicator.
- 4-speed motor drive for wider speed range.
- Reciprocating feed for chip removal on deep hole drilling.
- Forged spindle with gear integral.
- "V" type automatic turret clamping ring.
- Quick-set depth stops.
- Improved lead screw tapping head.

PRESENTS.....

TURRET DRILLING, TAPPING AND BORING MACHINES

SEE 7 TAPE CONTROLLED BURGMASTER TURRET DRILLS AT THE N-M-T-B EXPOSITITION BOOTH 834

TAPE CONTROLLED MACHINES TO BE SHOWN

Model 2BHT — 3/4" drill and tap capacity in steel; 2 hp; 10" x 18" positioning table; GE 2-axis tape control.

Model 2BHTL — 3/4" drill and tap capacity; 3 hp, 4-speed motor; 15" x 26" positioning table; GE 3-axis tape control.

Model 2BHTL — 3/4" drill and tap capacity; 3 hp, 4-speed motor; 15" x 26" positioning table; Hughes 3-axis tape control.

Model 25AHT — 1-1/4" drill and tap capacity in steel; 10 hp, 4-speed motor; 15" x 26" positioning table; GE 2-axis tape control.

Model 3BHT — 1-1/2" drill and tap capacity in steel; 15 hp, 4-speed motor; 20" x 30" positioning table; GE 2-axis tape control.

Model 3BHTL — 1-1/2" drill and tap capacity in steel; 15 hp, 4-speed motor; 30" x 45" positioning table; GE 2-axis tape control.

Model 3BHTB — double housing planer type; 1-1/2" drill and tap capacity in steel; 15 hp, 4-speed motor; 48" x 60" positioning table; GE 2-axis tape control.

WHAT BURGMASTER TAPE CONTROL MEANS TO YOU

Greatly reduced lead time — get into production in a few hours; Eliminates complex fixtures or index devices. Drill jigs and bushings not required; Much less spoilage on difficult jobs — machine does not depend on operator's skill; Greater accuracy — holds hole location to .001", repeatable to .0005"; Easy to program — 1 minute per hole location; Prepare tape — 4 holes per minute; Set-up machine — 3-5 minutes per tool.

Write for Bulletin describing the complete line of Burgmaster 6 and 8- Spindle Turret Drilling, Tapping and Boring Machines. Forty minute 16 mm sound film showing all Burgmaster Turret Drills in operation is available without charge.

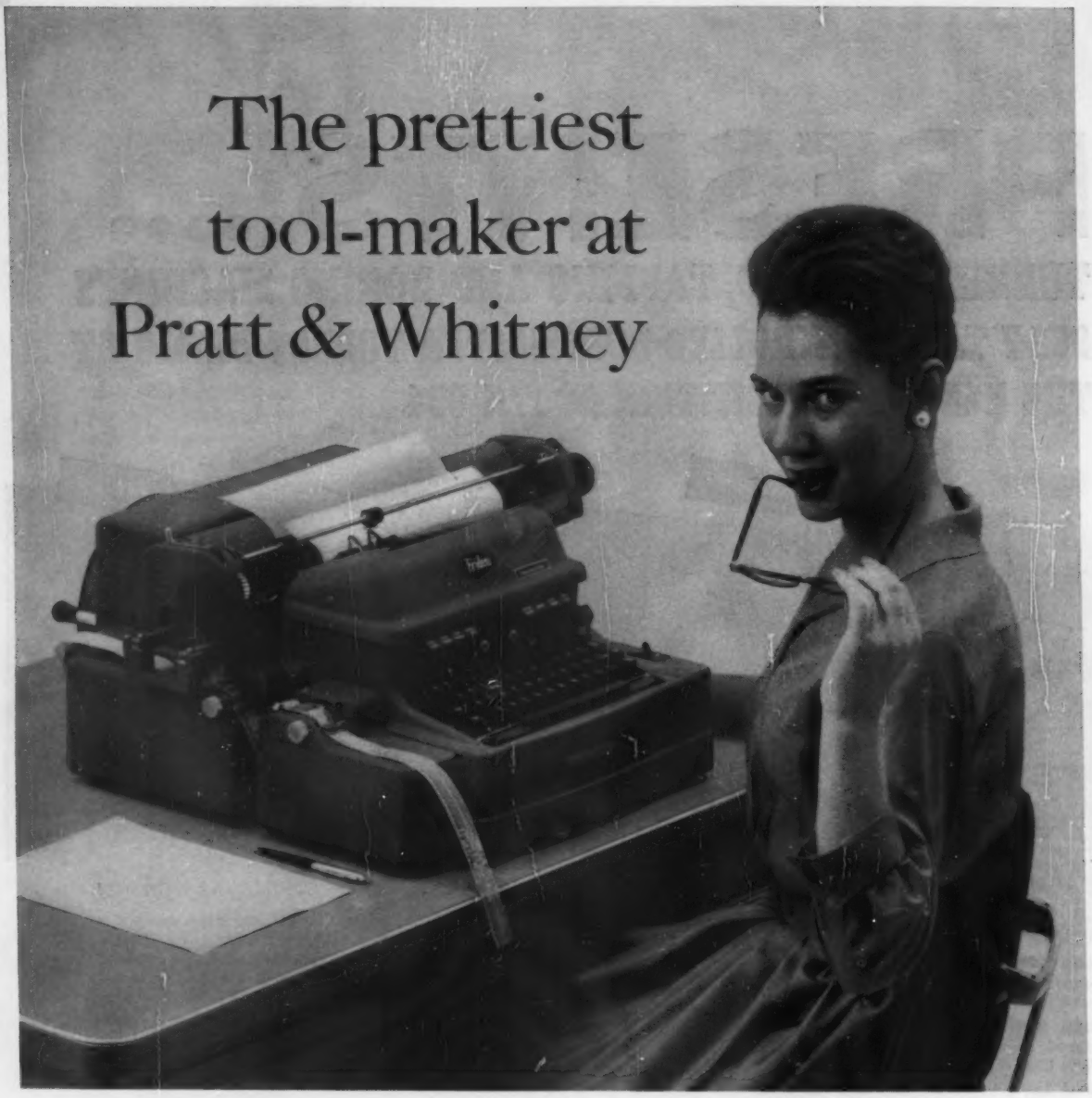
BURG TOOL

MANUFACTURING COMPANY, INC.
15001 South Figueroa St., Gardena, Calif.
FAculty 1-3510 • DAvis 9-4158

BURGMASTER DIRECT SALES OFFICES: Ridgewood, N.J., 86 North Maple Ave., Gilbert 4-3002 • **Chicago 5, Ill.,** 4908 Lincoln Ave., LOng Beach 1-1178 • **Cleveland 7, Ohio,** 14706 Detroit Ave., ACademy 6-7030 • **Detroit 37, Mich.,** 13730 W. Eight Mile Rd., LIncoln 8-4333 • **San Francisco, Calif.**

Plus dealer representatives in other industrial centers.

The prettiest tool-maker at Pratt & Whitney



She probably wouldn't know a micrometer from a hairpin, but using that Friden Flexowriter®, she's preparing a numerical control program tape which helps speed production of tools that are faster, more reliable and far more accurate than ever before.

Today, Pratt & Whitney Company is building five different types of numerically controlled machine tools—*and using numerically controlled tools to do much of the work!*

Significantly, Pratt & Whitney now uses eight-channel punched paper tape control exclusively. After much experimentation, P&W, like so many others in the field, has chosen punched paper tape as the best all-around input medium. Reliable, dependable, easy-to-program—punched paper tape is fast becoming the one thing that most numerically controlled tools have in common.

THIS IS PRACTIMATION: The Friden Model NC-1 Flexowriter is a perfect example of what we call PractiMation—automation so hand-in-hand with practicality there can be no other word for it.

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Friden Creates A New World For Business

Friden

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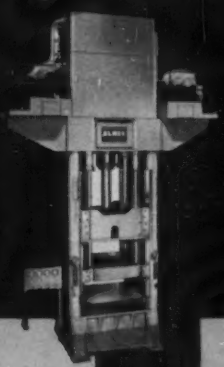
At CHICAGO (or anywhere) . . .
When you look at the
BETTER MACHINE TOOLS
you will see

KING

VERTICAL BORING AND TURNING MACHINES



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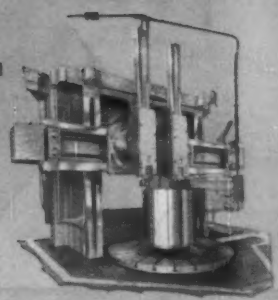
HYDRAULIC PRESSES AND EQUIPMENT

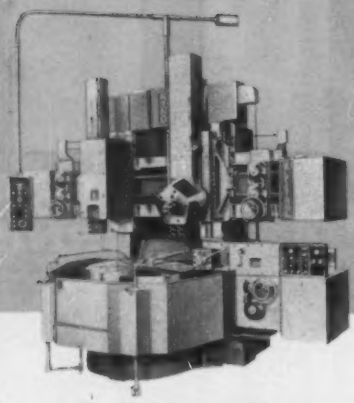
for Metalworking, Plastics Molding, Custom-designed Applications.

American Steel Foundries **ELMES/KING DIVISION,** Cincinnati 29, Ohio

KING

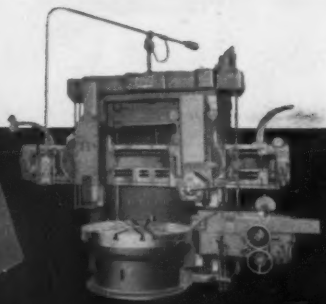
120" KING "ELECTROL"
Full Electrically controlled





56" KING "ELECTROL"
Full Electrically controlled

...the BETTER MACHINE

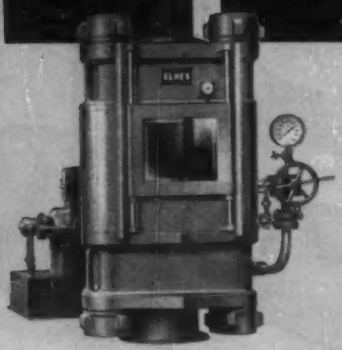


52" KING Manually controlled

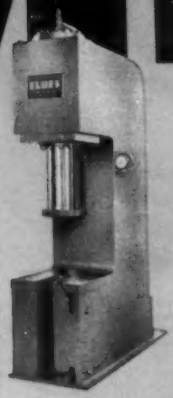
46" KING "ELECTROL"
with "Ultramatic"® automatic cycling

ASF *American Steel Foundries*

ELMES



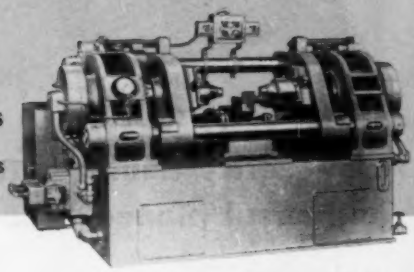
1000-ton ELMES
Hobbing Press



100-ton ELMES
C-Frame Press

400-ton ELMES
Bulldozer Press

200-ton ELMES
C-Frame Press

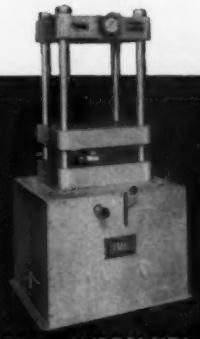


250-ton ELMES
Track Link
Assembly Press

TOOLS you will see at BOOTH 1406!

30-ton HYDROLAIR*

50-ton HYDROLAIR*



75-ton HYDROLAIR*

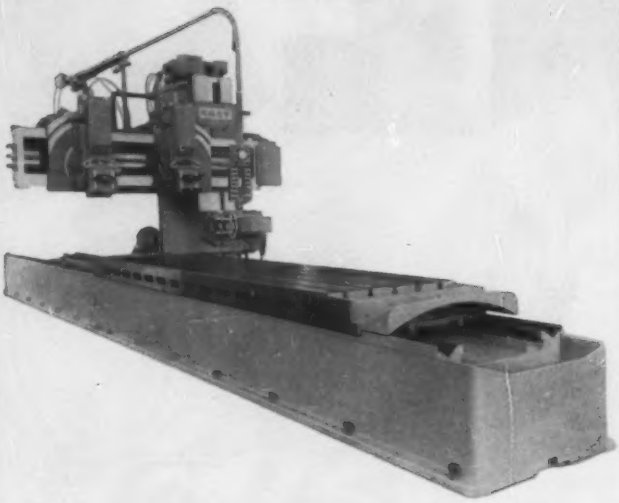
100-ton HYDROLAIR*

*ELMES "HYDROLAIR"® is an air-powered full oil-hydraulic press.

ELMES/KING DIVISION, *Cincinnati 29, Ohio*

MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY

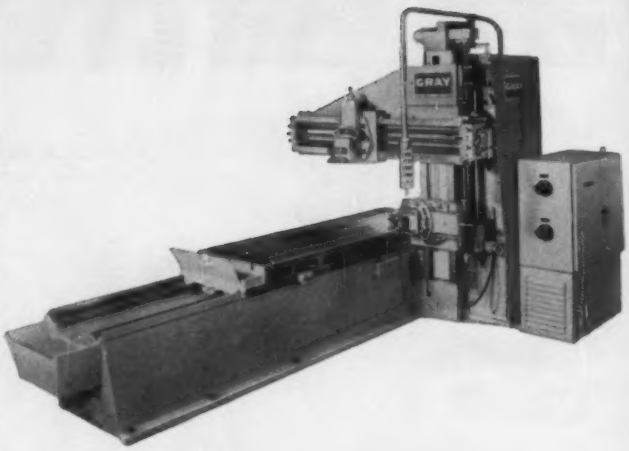
four reasons for



new GRAY double cutting universal planer

- 48" x 14'.
- Space-saver drive with floating shaft.
- Loop lubrication. Square lock rail and column.
- Improved head design. Simple feed.
- Duplex tables. Air tool lifters.
- Full remote control pendant station.
- Non-metallic table ways.
- 35/75 h.p. variable voltage drive.
- Table speed range 30—300 f.p.m.
- Feed range 64 increments 0—1".

on display — Booth 1350



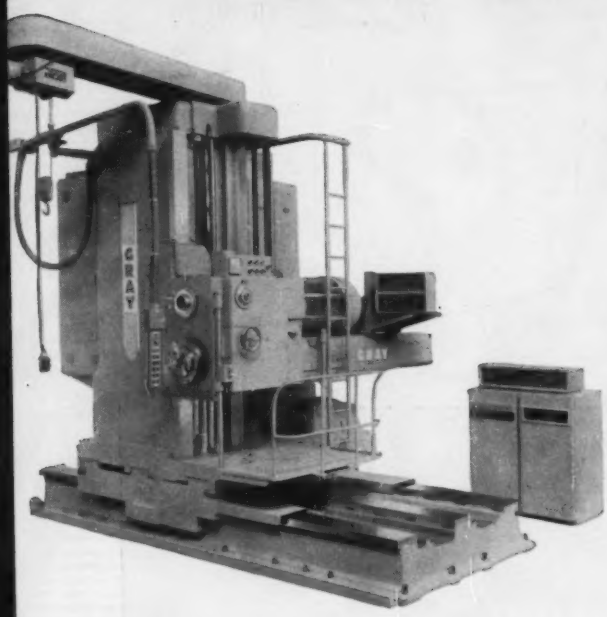
new GRAY flying scot universal planer

- 30" x 8'.
- Maximum planing height 31".
- Table width 30".
- Table speed range 30—300 f.p.m.
- Feed range—infinite 0—½".
- 60/75 h.p. variable voltage drive 180/1800 r.p.m.
- Maximum planing width 50".

on display — Booth 1350

new GRAY

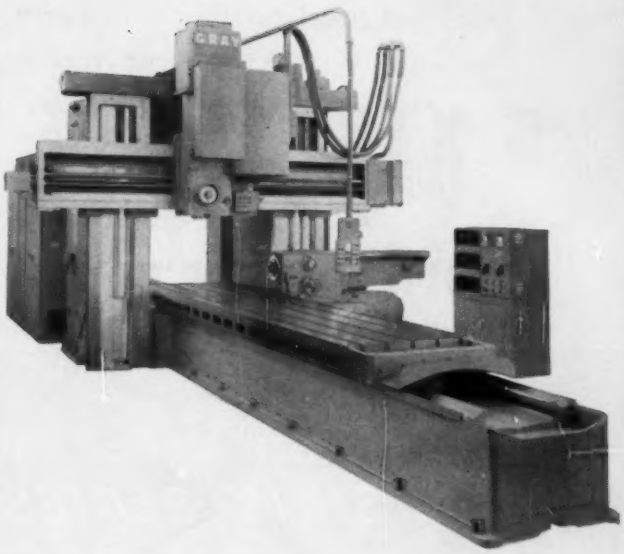
going to Chicago



new GRAY horizontal boring drilling & milling machine

- 6" dia. nitralloy bar. 60" bar travel.
- 72" vertical head travel.
- 96" column travel on runway.
- 36" column cross travel.
- 50 h.p. spindle motor.
- 4.5—900 r.p.m. spindle speed range.
- Full remote control pendant station.
- Phase III spacesetter equipment for — horizontal movement of column along runway and vertical movement of head on column—tape reader and reading devices together with related control in floor mounted console.

on display — Booth 1350



new GRAY planer type milling machine

- 48" x 48" x 16'.
- 10" quill, 50 h.p. non-swiveling milling rail head. Width between housings 61".
- 5" bar, 30" travel, 25 h.p. boring side head.
- Maximum width between side head spindle noses 53½".
- Maximum height between table top and rail head spindle nose 52".
- 18 spindle speeds—10—500 r.p.m.
- Cable feed range ½"—200" per minute.
- Head feed range ¼"—100" per minute.
- Phase I spacesetter, railhead, sidehead and table.

on display — Booth 1350

THE G. A. GRAY CO. • CINCINNATI • OHIO

cost cutters

RIVETT

– introduced earlier this year
– the first in the

SIXTY SERIES

the precision

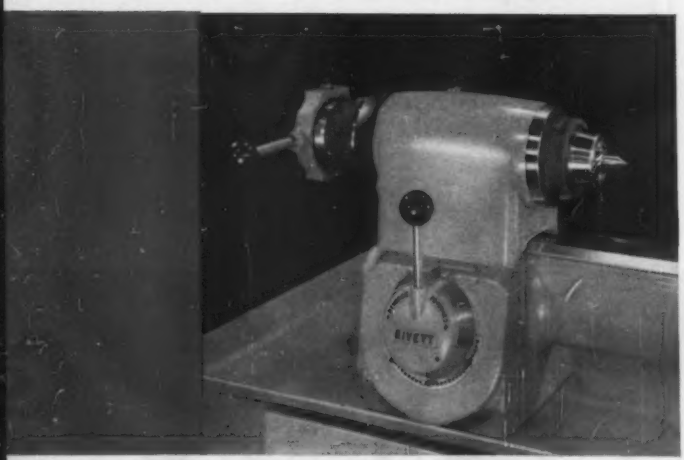
SPEED LATHE

now meet the second member of the SIXTY SERIES –

THE PRECISION

TURRET LATHE

featuring "one motion control"



1 Single lever starts lathe spindle and selects any speed within the range up to 4800 r.p.m. Same lever will change speed during operation, instantly stop or reverse spindle and control air operated collet closer. No waiting during speed selection or speed change. Stops may be set for repeating selected speeds on duplicate work.

Stay ahead in the 60's with

RIVETT

Greater flexibility of control plus a precision known only to the toolroom makes this all new machine a gem of production efficiency.

and 4 other Rivett "firsts" for greater accuracy and more productivity on initial machining and second operations

2 **NEW AUTOMATIC INDEXING TURRET** with hardened steel slides. Turret head supported by large, rigid tapered roller bearings. Takes ¾" dia. tool shanks standard or 1" special. Index locking pin mounts on preloaded roller bearings. Turret slide passes over top of double tool cross slide and can be adjusted for vertical and horizontal alignment to spindle.

3 **SPINDLE WITH TRUE ROUNDNESS AND RIGIDITY.** Large diameter super-precision ball bearings fitted to in-line ground mountings. Constant bearing preload holds spindle rigid against both side and end pressure of cutting tool. Unusually heavy wall and wide bearing spacing contribute to rigidity.

Endless vee belts replaced without disassembling spindle. Style 7R stationary collet, 15/16" cap., for bar stock. Style 6R Draw-in collet, 1¼" cap., and step chucks up to 6" for second operations.

4 **NEW BED FORM FEATURES DOUBLE-BEVEL AND DOVETAIL.** Double-Bevel positively centers turret in alignment with headstock and the large bearing area prevents below-center wear. Dovetail aligns double tool cross slide and evenly distributes its bearing on top of bedway as tool pressure pulls against inverted dovetail.

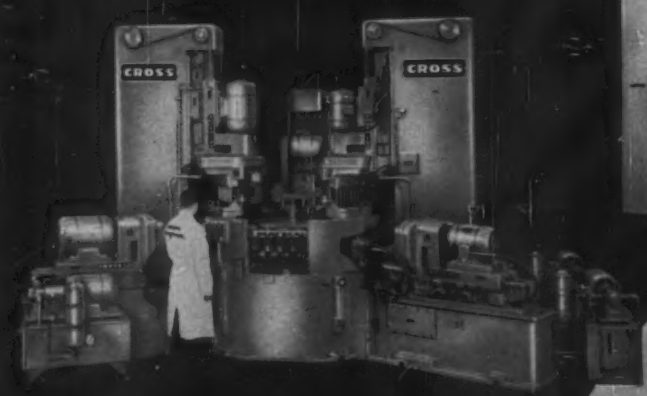
5 **DISTORTION-FREE MOUNTING.** Uneven or non-rigid floor cannot distort lathe. Bed has three-point mounting on a steel channel isolated from any distortion of cabinet.

Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Massachusetts

SEE HOW RIVETT MACHINES SAVE TIME AND MONEY—BOOTH 1210, MACHINE TOOL EXPOSITION, 1960

6 ways to automate

Cross automation takes many forms . . . from the simplest low production machines to complex equipment for mass production.

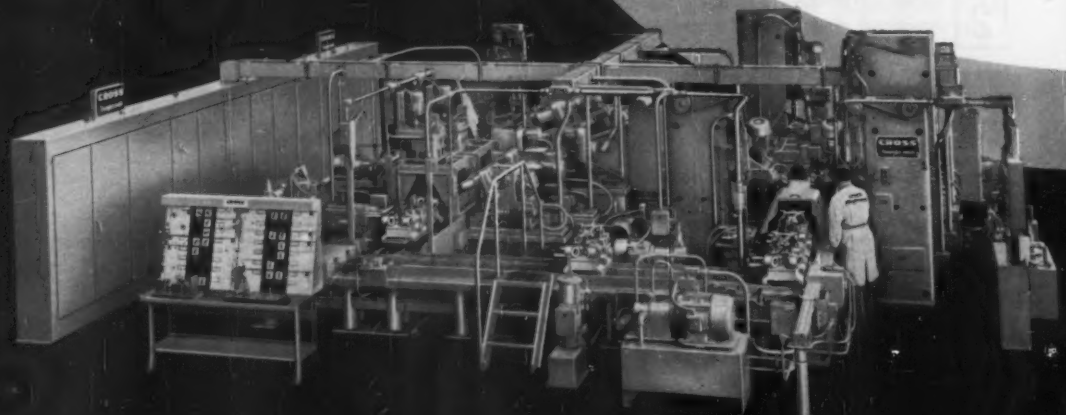


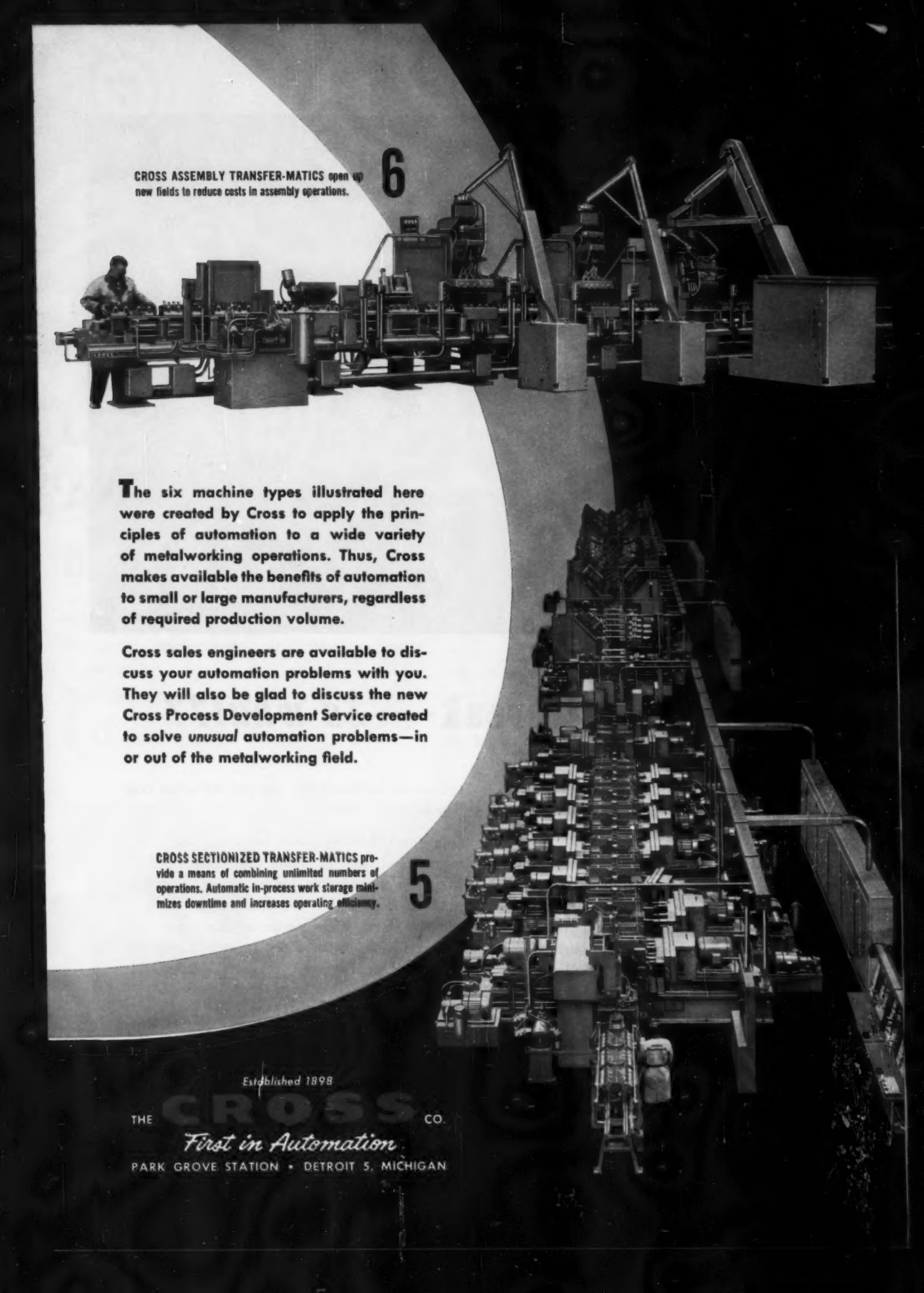
1 **CROSS SINGLE STATION MACHINES** exist in many configurations to combine operations.

2 **CROSS DIAL TYPE MACHINES** provide multiple station performance with minimum floor space.

3 **CROSS TRUNNION TYPE MACHINES** are compact multiple station units that permit operations on opposite sides of the part.

4 **CROSS PALLET TYPE TRANSFER-MATICS** provide capacity for combining a large number of operations. Standard pallet fixtures handle irregularly shaped parts with maximum flexibility.





CROSS ASSEMBLY TRANSFER-MATICS open up new fields to reduce costs in assembly operations. 6

The six machine types illustrated here were created by Cross to apply the principles of automation to a wide variety of metalworking operations. Thus, Cross makes available the benefits of automation to small or large manufacturers, regardless of required production volume.

Cross sales engineers are available to discuss your automation problems with you. They will also be glad to discuss the new Cross Process Development Service created to solve *unusual* automation problems—in or out of the metalworking field.

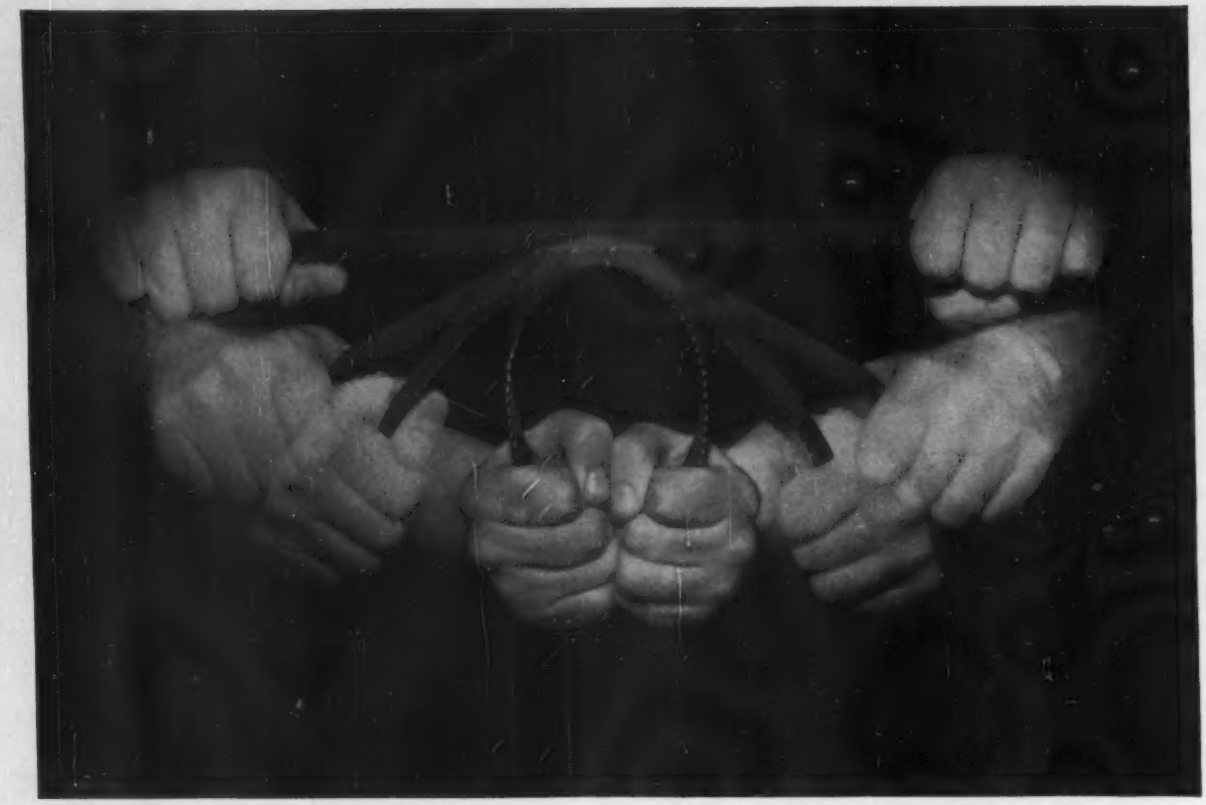
CROSS SECTIONIZED TRANSFER-MATICS provide a means of combining unlimited numbers of operations. Automatic in-process work storage minimizes downtime and increases operating efficiency. 5

Established 1898

THE CROSS CO.

First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN



So it doesn't break---*So what??*

So we can bend a MARVEL High-Speed-Edge Hack Saw Blade double, and it won't break. Does this prove anything?

Let's see if it does. When you buy a box of hack saw blades, you expect each blade to have a reasonable cutting life. For example, take an ordinary blade that costs $4.00, and you expect it to produce 2000 sq. inches of accurate cutting-off before it is discarded. Would you be willing to pay $8.00 for that same blade? *You will, if it breaks halfway through its expected life.*

Bending a MARVEL High-Speed-Edge Hack Saw Blade to demonstrate that it is truly unbreakable proves the point that you get every square inch of blade life you pay for when you buy MARVEL Blades.

Safety to both operator and machine, plus maximum blade life, seem like value enough from this remarkable blade. However, these MARVEL Blades give you even more, for they will cut faster, with greater accuracy because they can be safely tensioned more taut in your machine than ordinary "breakable" blades and are therefore more rigid to resist deflection.

Cost? Unbreakable MARVEL High-Speed-Edge Hack Saw Blades are priced competitively. Use MARVEL Blades consistently with complete confidence because they have no equal for value. Leading Industrial Distributors stock and sell MARVEL. Ask yours today.

ARMSTRONG-BLUM MANUFACTURING CO.
5700 West Bloomingdale Avenue • Chicago 39, Illinois

MARVEL Metal Cutting SAWS
Better Machines—Better Blades

SEE GISHOLT PRODUCTION POINTERS IN ACTION AT THE SHOW! Booth No. 1042

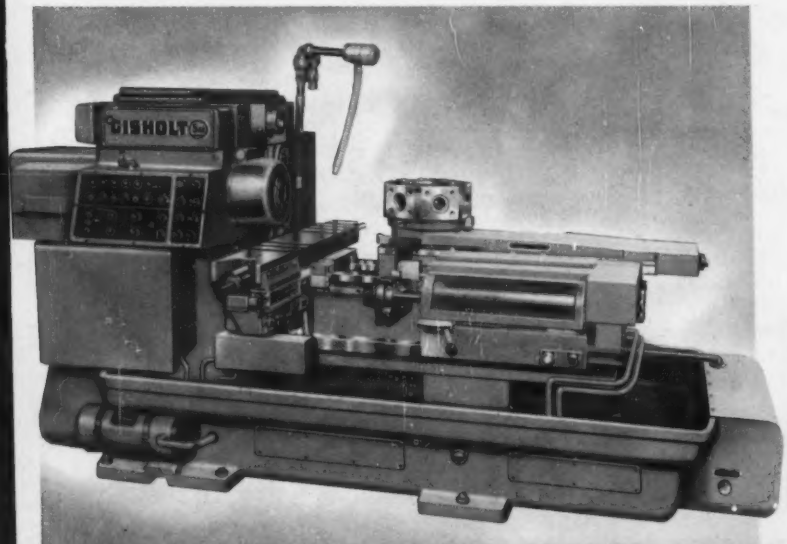
MMT-PE

Latest advances in: Automatic Machining, Tape Control, Balancing, Superfinishing, Tracing

You'll take a big step ahead the moment you set foot in the Gisholt booth — at the Machine Tool Exposition.

The Gisholt booth will be alive with demonstrations showing new ways to cut costs, simplify your work and boost quality.

You'll see dramatic developments in such fields as magnetic and punched tape control—improved techniques in balancing, Superfinishing and automatic machining for job lots and production work. You'll see 15 machines in action—a few of which are shown here.



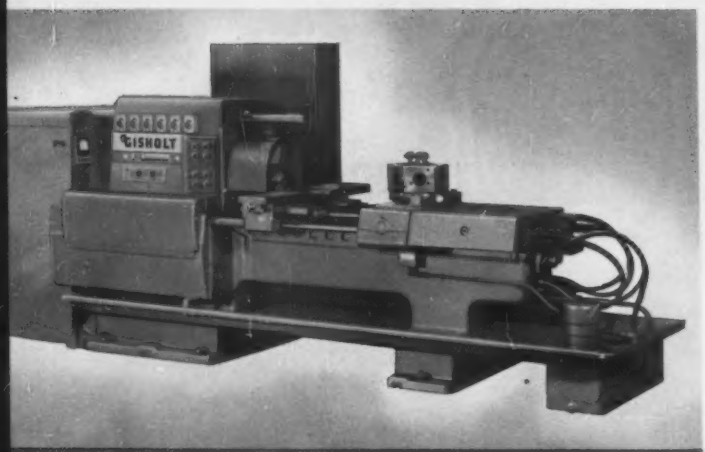
Gisholt MASTERLINE No. 5 AR
Automatic Ram Turret Lathe

First public showing of the Gisholt AR®

See the first Automatic Ram Turret Lathe — the Gisholt AR — handle both bar and chucking work with fast setup and automatic cycle machining — new savings in tooling, time — and increased operator productivity.

For information on AR Lathe, circle or write in No. 722 on inquiry card.

Latest advances from GISHOLT in action at the show — Booth No. 1042



Gisholt MASTERLINE® 3F Fastermatic Automatic Chucking Turret Lathe

New FeeDial® Control slashes setup time

Don't miss the Gisholt 3F Fastermatic Automatic Chucking Turret Lathe featuring new FeeDial Control. Now you can dial your feeds, flick your speed and function switches in just 15 minutes! Then set your tools and take your trial cuts.

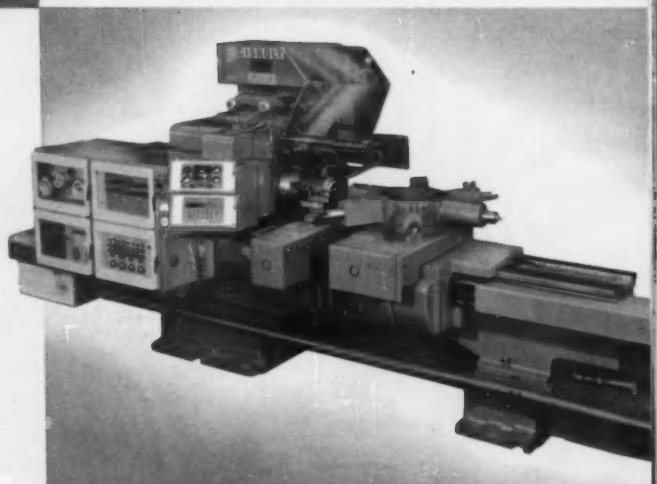
For information on 3F with FeeDial Control, circle or write in No. 723 on inquiry card.

New FACTROL® with continuous-path magnetic tape control

Push the button on the new Gisholt 101 FACTROL Magnetic Tape Controlled Turret Lathe and watch the standard single-point tools on the hex turret and cross slide machine intricate contour and step work on some really tough parts. See a FACTROL tape prepared on a simplified program computer.

Learn how your engineering department can use the FACTROL 101 to control production, cut your inventory and lead-time requirements — how it can handle your toughest parts with dramatic savings, both in time and in tooling.

For information on Factrol 101, circle or write in No. 724 on inquiry card.

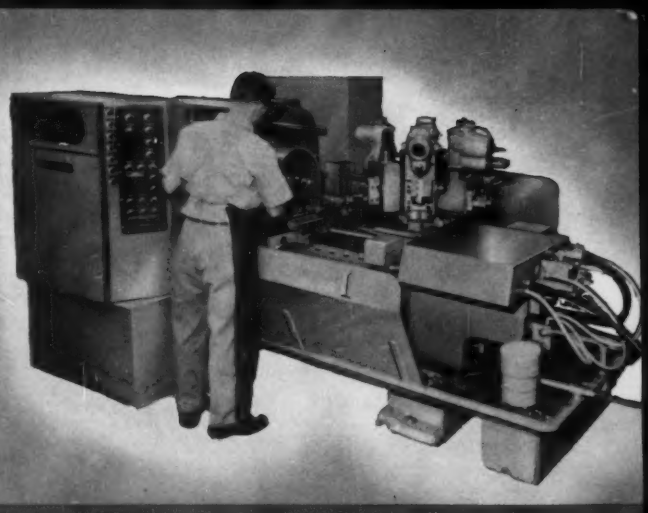


Gisholt MASTERLINE Factrol 101 Turret Lathe

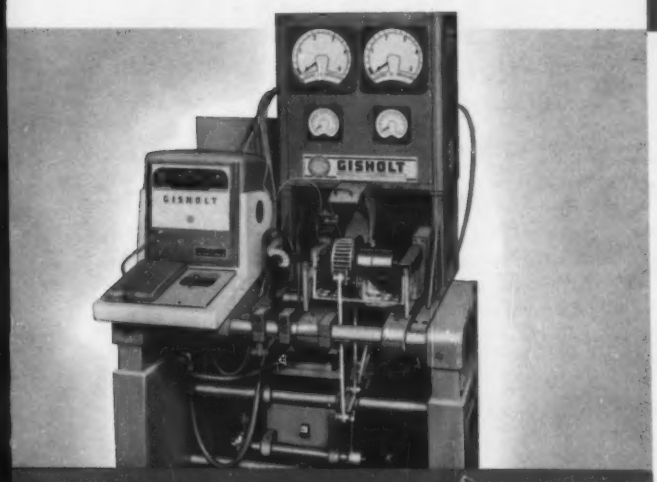
Fastermatic® with point-to-point punched tape control

See a punched tape controlled Fastermatic Automatic Chucking Turret Lathe "think" its way through routine jobs. Again, production is controlled by your engineering department. This is IT for fast setup and automatic production on standard work without contours.

For information on Tape controlled Fastermatic, circle or write in No. 723A on inquiry card.



Gisholt MASTERLINE 1F Fastermatic Automatic Chucking Turret Lathe



Gisholt MASTERLINE 1S Balancing Machine

Balancer boosts production efficiency

Be sure to see the Gisholt 1S Balancing Machine — a machine equipped with "holding" meters. One set of meters for each correction plane indicates exact angle and amount of unbalance, and then "holds" the readings until the part is corrected — reducing chance of operator error and boosting production efficiency.

And watch exacting tests performed on the large Gisholt 4U Balancer. Note that both the 1S and the 4U Balancers require no special mountings — are unaffected by vibration from surrounding equipment.

For information on Balancing Machines, circle or write in No. 725 on inquiry card.

New Superfinisher® with automatic size control

Get the facts on the new Gisholt MASTERLINE 51B Superfinisher — a machine offering new economy on single- or multiple-diameter work. Note how the optional automatic size control offers consistent quality on close-tolerance work.

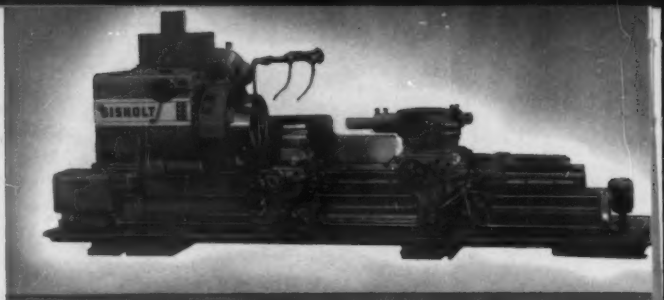
See the single-spindle, high-production Model 81 Superfinisher for flat, conical or spherical surfaces. Vertical design is ideal for use with in-out conveyor systems . . . requires minimum floor space and may be easily added to high-production lines.

Don't miss the Superfinishing attachments designed to fit on the front carriage of engine or turret lathes. These can also be applied to boring mills, grinders and automatic lathes.

For information on Superfinishing Machines, circle or write in No. 726 on inquiry card.

Gisholt MASTERLINE 51B Superfinishing Machine

See Gisholt Production Pointers in action at the show, Booth No. 1042



Gisholt MASTERLINE 5L Saddle Type Turret Lathe

Rugged 5L makes big jobs simple

See how efficiently the Gisholt MASTERLINE 5L Saddle Type Turret Lathe whips the heavy stock removal problems on massive steel chuck body forgings. Note the rigidity that permits use of ceramic tools on finish facing and turning cuts.

And find out how a Gisholt MASTERLINE 2L Saddle Type Turret Lathe with a turret-mounted JETracer slide tool gives you many of the advantages of automatic operation on a hand-operated machine — eliminates human error, saves on setup time and tooling costs.

For information on 5L Saddle Type Lathes, circle or write in No. 727 on inquiry card.

Gisholt MASTERLINE No. 12 Automatic Production Lathe

JETracer® on single-spindle automatic simplifies multiple-diameter work

Watch while a No. 12 Automatic Production Lathe, equipped with a 4-pass JETracer on the front carriage, makes short work of multiple-diameter machining — contours, steps and radii. A ceramic tool on the final pass holds close tolerances and provides fine finish.

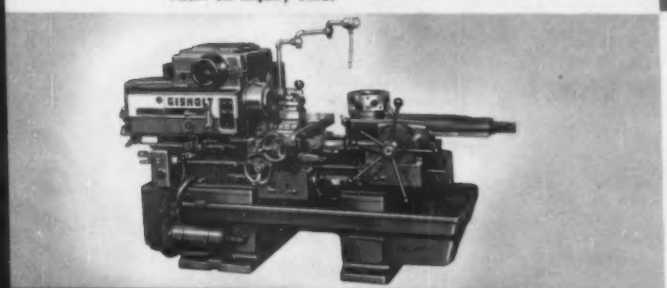
For information on No. 12 Automatic, circle or write in No. 728 on inquiry card.

Simplimatic® cuts costs, boosts accuracy on bevel gear work

Discover the advantages of the Simplimatic's big, flat platen table on bevel gear work — how it permits rigid, compact tooling right up to the work for accuracy, maximum metal removal and long tool life.

For information on Simplimatic, circle or write in No. 728A on inquiry card.

Gisholt MASTERLINE Simplimatic Automatic Lathe



Gisholt MASTERLINE No. 4 Ram Type Turret Lathe

JETracer on bridge-type cross slide adds flexibility

And see how the Gisholt JETracer brings new cost and time savings to contour work on a standard Gisholt MASTERLINE No. 4 Ram Type Turret Lathe.

For information on Ram Type Turret Lathes, circle or write in No. 722A on inquiry card.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

The Gisholt Round Table represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

No. 7-860
764

Turret Lathes • Automatic Lathes • Balancers • Superfinishers
Threading Lathes • Packaging Machines • Masterglas Molded Plastic Products

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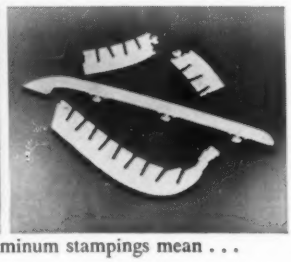
PRECISION Quarterly NUMBER 4

PRECISION WELDER AND FLEXOPRESS CORPORATION, 3520 Ibsen, Cincinnati 9, Ohio



For this magnificent automobile, these aluminum stampings mean . . .

Grille Parts TEN TIMES FASTER

DETROIT – How much would you pay for a 900 per cent boost in production efficiency? The builder of one of America's most fashionable automobiles decided it was well worth the price of a new Precision Flexopress.

The automaker had been punching out grille parts on standard sheet-fed presses. The fins are made of .120" aluminum. They have to interlock, egg-crate fashion, and look flawless in the finished product. But even for flawless decoration, the production rate of only 1000 fins an hour was exasperatingly slow.

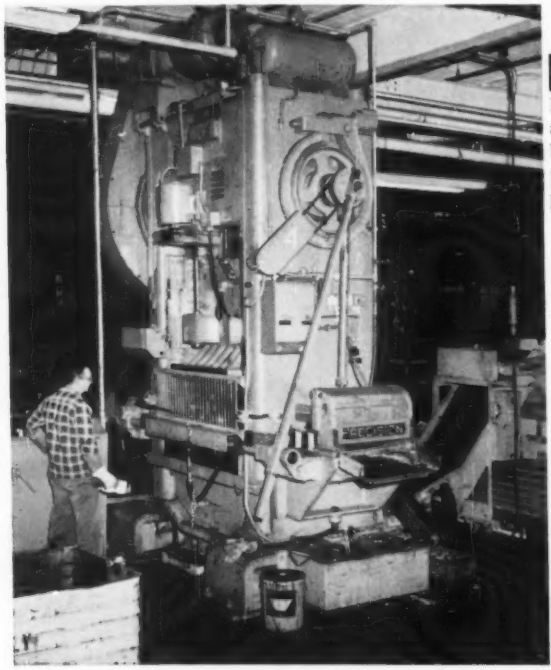
That was before the new Flexopress was installed. Now this same automaker turns out 1000 fins in seven minutes, which is a very fortunate situation because his cars are selling fast.

The Flexopress came equipped with unreeling and flattening equipment for handling up to 22" wide coils. Otherwise, it is a standard, heavy-pattern, 200-ton Flexopress with 6" stroke, complete with built-in coil feed, and designed for general purpose blanking, forming, and light drawing.

It got so far ahead on grille fin production that Planning started pulling jobs off slower presses and putting them on the Flexopress. One was an 11½" long hood retainer spring which the Flexopress proceeded to blank and punch from wide steel strip at a rate of 120 per minute, and with the die off center, too.

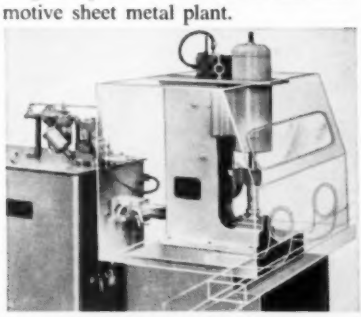
People who know presses know the reasons: The Flexopress is the only press constructed with pre-loaded, ball bearing slides. With no sliding ways to heat up, there's no thermal misalignment and no lubrication problem. The ram can't oscillate – it moves in one plane only and holds its alignment. That means longer die life and accuracy that doesn't depend on leader pins and bushings. So it's no idle boast that at 150 strokes a minute, this 200-ton press with 6" stroke can really hold its bottom-of-ram-to-bed accuracy of .0005" or less per foot of bed length.

The reputation of a press is based on the job it does – and Flexopress is winning bouquets for its work at this automotive sheet metal plant.



PRECISION Flexopress made a 900 per cent boost in grille production possible.

NO WELD TOO CRITICAL



WELDED TRANSISTORS? OF COURSE!

Here's a new line of Precision Magnetic Force Welding Gun machines developed for making ring welds to seal transistor "cans." Clean-cut design makes it easy to enclose these guns in dry boxes for controlled atmosphere welding. Magnetic force, which applies pressure at the critical moment of maximum heat, assures a 98 per cent or better yield of gas tight welds on transistors big as a walnut or small as a grain of rice.

Remember, when you want to make critical welds, Precision has the experience to help you do the job right.

For more data circle this page number on card at back of book

INDUSTRIAL DISTRIBUTOR
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All these ... and many more

Whether your threading requirements cover miniature or very large tools, average or extremely close tolerances, run of the mill or space age components, short runs or long repetitive runs, somewhere in the GEOMETRIC line there is a tool for the job.

Precision operation, simplicity of design, interchangeability of chasers, high quality of materials and workmanship have made the name GEOMETRIC mean superlative tools.

If you are not at present a user of GEOMETRICS, we invite your inquiries. If you are a user, we suggest further investigation of the broad line for other applications.

For more information on the COMPLETE GEOMETRIC line, including range of sizes, special adaptations and styles not shown above, call your local GEOMETRIC Distributor, or write to

GEOMETRIC-HORTON NEW HAVEN 15, CONNECTICUT

Visit Booth 345 National Machine Tool Show

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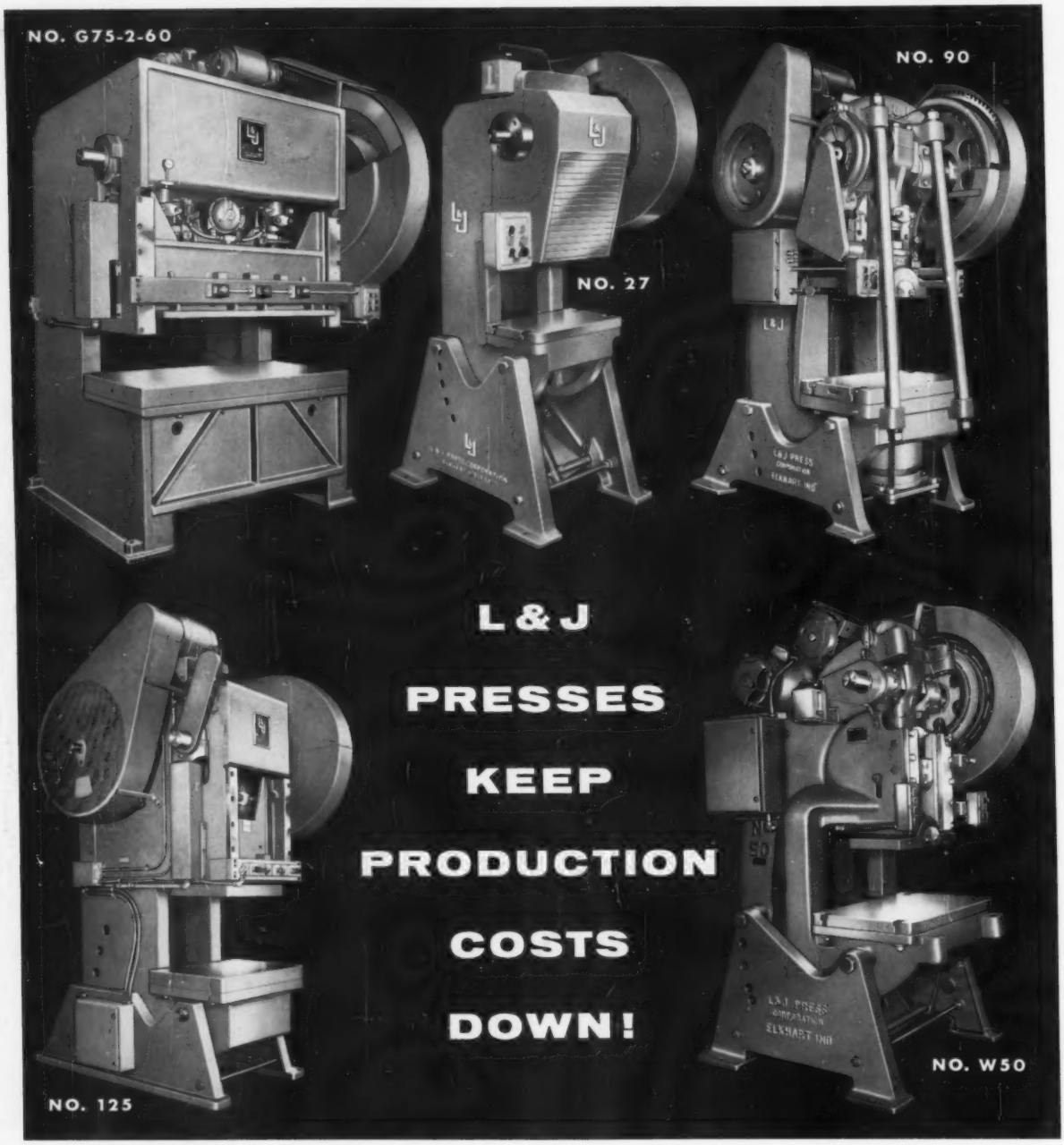


SEE THEM

in action at Space 1116
N.M.T.B.A. Exposition—
International Amphitheatre.

When you have to take a second look at production costs, it's time to look at today's L & J Presses. Their modern design is based upon actual experience in meeting today's requirements in user's plants. You'll find their efficiency, dependability and accuracy bring lower production costs.

There is a type and size to meet a majority of press requirements. O.B.I. Presses are available in 14- to 150-ton capacities, Straight Side Presses in 20- to 150-ton capacities and Gap Frame Presses are made in 30- to 75-ton capacities. Optional equipment is available for specific tooling requirements. *Write for new catalog.*

L & J PRESS CORPORATION, 1631 STERLING AVENUE, ELKHART, INDIANA

For more data circle this page number on card at back of book

Specify **SKINNER**

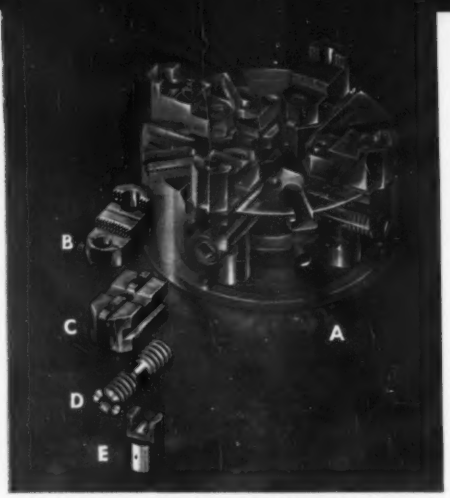
Independent Chucks for accuracy and long service in severest work

FORGED STEEL BODY withstands extreme jaw pressures developed on modern production lathes.

Large Diameter Operating Screws permit long range of jaw adjustment and assure precision control of jaw movement.

Hardened Steel Solid Thrust Bearings absorb end thrust on flat parallel faces and are rigidly fitted to the chuck body.

Accurately Ground, Hardened Jaws available in two-piece construction shown here, master jaw with reversible hard stepped top jaw—or one-piece solid hard stepped reversible jaw.



A—Transparent view of heavy-duty independent chuck
B—Hard, stepped reversible top jaw C—Master jaw
D—Operating screw E—Solid thrust bearing

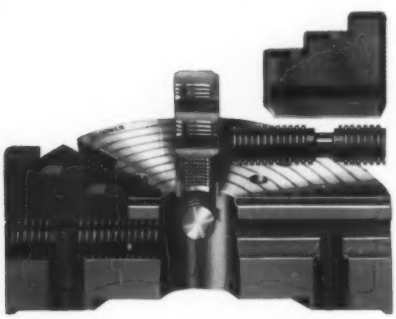
Superior Skinner design assures superior independent chuck performance

Skinner design achieves top chuck performance by combining separate parts of one chuck so that every part functions perfectly and in maximum support of other parts. See how the forged steel body surrounds more than 60% of the operating screw *for the full length of the screw*. Note the carefully machined jaw slots with heavy ribs to guide jaw movement and help hold jaw and screw in proper alignment at all times. See how the precision square threads of jaw and operating screw contribute further to even distribution of the strains set up by heavy gripping pressures. Every part is carefully made to exacting standards, and the whole chuck is *designed* to provide maximum gripping and accuracy.

Skinner heavy-duty independent chucks are designed for the rugged service required on modern turret lathes and have additional features such as:

- Wider jaws
- Larger and heavier operating screws
- T slots
- Specially designed bearings

An additional feature is the design of the master jaws below the face of the chuck, so that when top jaws are removed the chuck can be used as a face plate for clamping work.



Side view showing precise fit of operating screw, thrust bearing and jaw in medium duty chuck (solid jaws shown)

End view showing how chuck body surrounds 60% of screw circumference

General Information and Features	
Types and Sizes	Heavy-duty—12″ to 28″ Medium-duty—4″ to 36″ Light-duty—6″
Mounting	Skinner independent chucks are available for direct mounting on American Standard Spindles and for mounting on threaded spindle noses by means of separate adaptor plates.
Soft Blank Top Jaws	Standard height, extra high and long pointed sizes are available for heavy and medium duty chucks. Can be supplied or shaped to meet specific requirements.

Skinner manufactures a complete line of self-centering and combination scroll chucks, self-centering geared screw chucks, power chucks and accessories, packaged power chucking assemblies, and vises for milling, drilling and general machine work.

For complete details on Skinner Chucks and up-to-date information on major chuck developments, contact your Skinner representative or distributor, or write to us.

SKINNER CHUCKS®

THE CREST OF QUALITY

SKINNERCHUCKS

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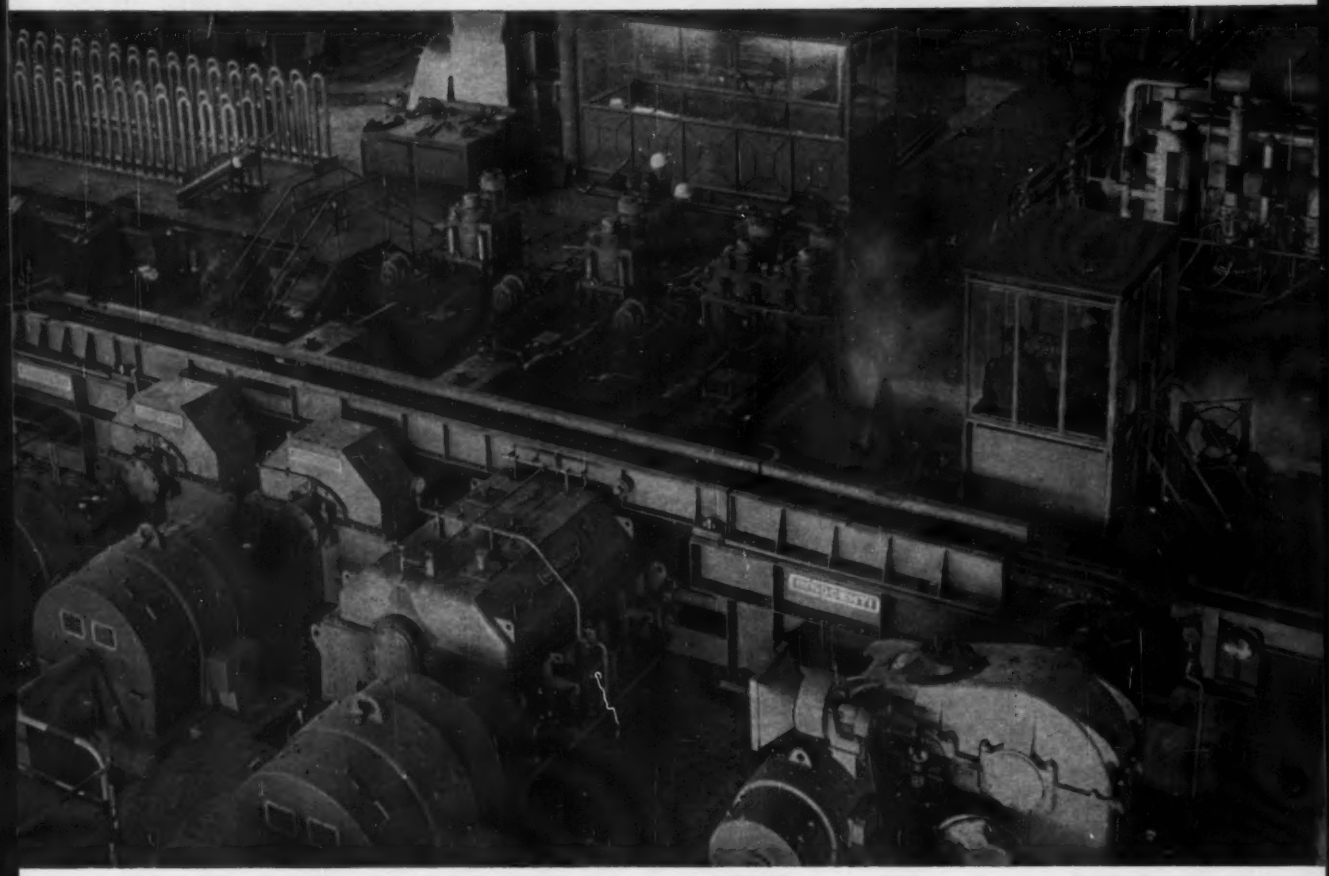
INNOCENTI mechanical division



Continuous Mill in operation at DALMINE S.p.A. works in Costa Volpino, Italy

continuous mill

for the manufacture of seamless steel tubes and pipes

The Continuous Mill associated with the Stretch Reducing Mill in the double version for making tubes from $^3/_8$" to 4" and from $2^3/_8$" to 7" successfully meets present requirements for consistently higher quality and quantity.

- Highest Capacity: the annual production can reach respectively 150,000 and 250,000 tons in the two versions.
- Highest yield: 93% - from billet to tube
- Complete automation: 1,5 man hour per produced ton
- Possibility to make tubes with 2,25 mm minimum thickness without stretching
- Extremely easy to operate
- Low installation costs in respect of capacity.

These features make the Continuous Mill the most reliable tube making equipment for new installations or the modernization of the existing ones.

INNOCENTI

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Don't handicap any new grinder . . .

give it the Norton wheel it needs!

Scores of new grinding machines will be on display at Chicago — cylindrical and centerless grinders, surface grinders large and small, internal grinders, tool grinders of all kinds, thread grinders, disc grinders, universals. Whichever you buy keep in mind that:

FIRST: No grinding machine can be better than its grinding wheel.

All the design talent and skill that goes into producing any grinding machine . . . including ours . . . is brought to a focus on one relatively small element — the contact area between grinding wheel and workpiece. Naturally, if the wheel that makes this contact is a below-par performer, so is the entire machine.

SECOND: No grinding wheel can be better than a Norton wheel.

This second fact is just as solid as the first. For Norton has put more time and effort into the pioneering and development of abrasive products than has any other organization. The result is unquestioned in the abrasive field. Norton wheels have been giving on-the-job proof of top performance for 75 years. And today Norton continues leadership in the following:

Product Variety. The Norton line is the world's most complete, with exactly the right wheel for every grinding job you do. Included are diamond wheels, using mined or man-made diamonds . . . plus newest developments in bonds and abrasives . . . every wheel type and size you can name.

Application Assistance. Quickly available from your Distributor's Norton-trained specialist or your Norton Man. Your grinding jobs will be studied and the most effective wheel for each one will be recommended by an expert abrasive engineer.

Local Stocks. Your Norton Distributor keeps his stocks ample to meet his area's needs — yours included . . . and in five strategic centers there are Norton warehouses with thousands upon thousands of wheels. The wheels your grinders need for best performance — and *you* need for lowest grinding costs are handy to you. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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Sier-Bath's Tri-Dimensional Gear Service

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2. GEARS GUARANTEED TO MEET YOUR REQUIREMENTS

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GEAR RANGE and SERVICES

- Bevel Gears, Straight and Coniflex, 2" to 24" O.D., depending on ratio, 3 to 32 Pitch.
- Miter Gears, 2" to 17" O.D., 3 to 32 P.
- Spur Gears, 2" to 48" O.D., 3 to 48 P.
- Helical Gears, 2" to 48" O.D., 3 to 48 P.
- Ground and Crown-Ground Helical and Spur Gears to 12" O.D., 4 to 48 P.
- Other Ground Tooth Spur Gears to 17" O.D., 4 to 16 P.
- Worm Gears, 2" to 48" O.D., 3 to 32 P.
- Worms to 12" O.D. by 36" long.
- Ground Thread Worms to 6" O.D.
- Herringbone Gears, to 36" O.D., 3 to 24 P.
- Instrument Gears, 1" dia. up, to 48 P.
- Internal Gears, 2" to 36" O.D., 4 to 48 P.
- Involute and Square Splines, ground and unground to 16" O.D. by 36" long.
- Shafts, splined and pinioned to 60" long.
- Internal Helical Broaching to 24" Diameter of Blank.
- Precision Hobbing, Shaving, Grinding of all materials.
- Gear Boxes custom designed and mfd.

Your first bonus from Sier-Bath's Tri-Dimensional Service is free consultation with our gear design engineering staff of incomparable ability developed through designing unending thousands of advanced design successes. Your gears and gear units are designed to the most advanced principles of "gearometry," to assure the *ONE best gear design for your particular application the first time around*.

Your second bonus is the infallibly accurate —and economical—production of your gears and gear units by Sier-Bath's skilled gear craftsmen, working with the most advanced, automatic, high-speed production equipment and the most extensive gear testing equipment ever assembled under one roof. Sier-Bath precision gears provide master gear benefits at a fraction of the price.

Your third bonus is the use of our gear experts at your plant or in the field, before and after installation, to assure the advantageous performance and saleability of your units.

Make Sier-Bath your "gear department" for complete service including design, engineering, tooling, production, inspection and dependable field service. You'll save engineering time, get better gears at lower cost and give your machines utmost productive capacity and trouble-free operation.

Send your gear drawings—or request one of our engineers to discuss your gear applications. Write for comprehensive Gear Manual on your company letterhead.

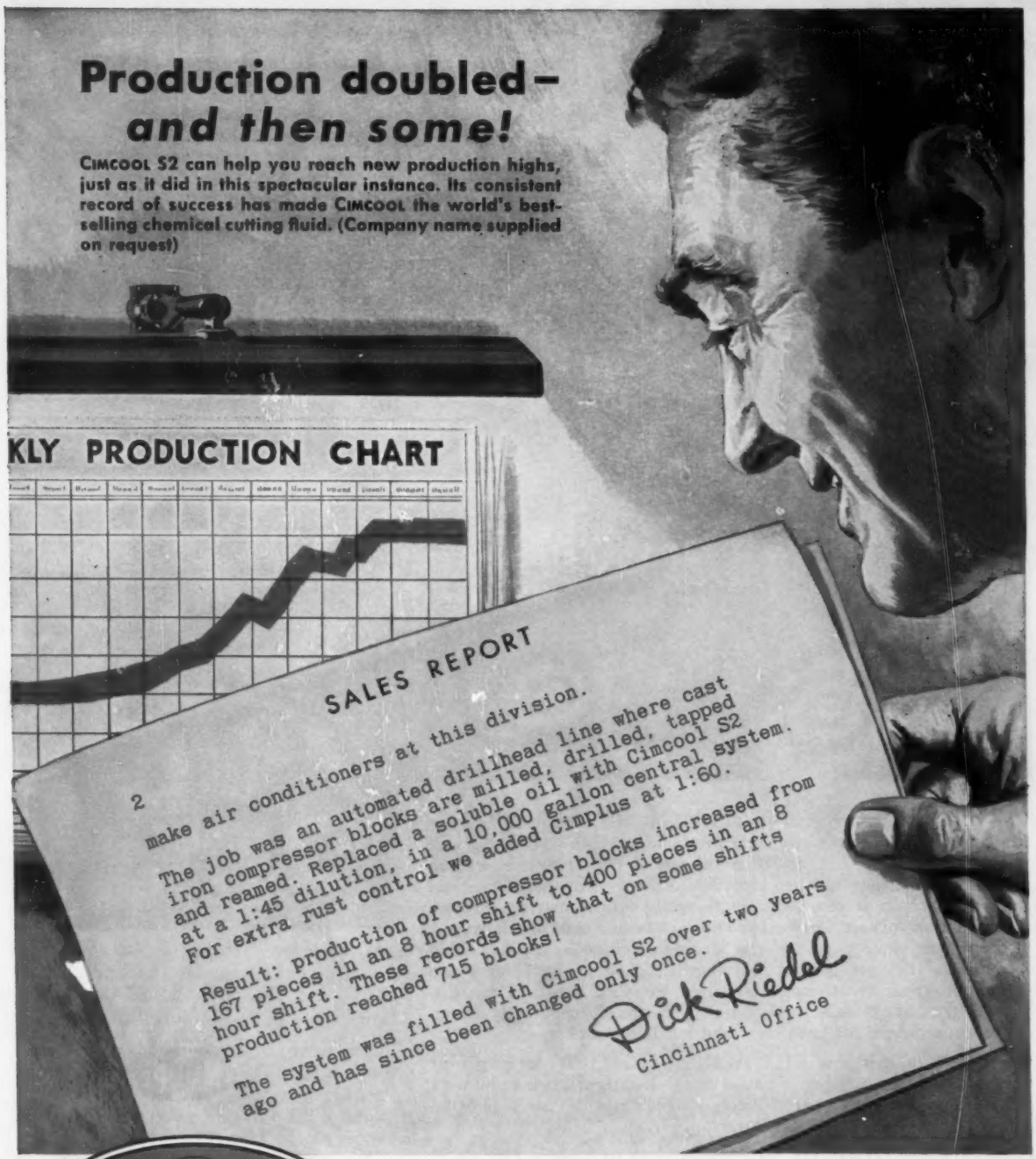
Sier-Bath GEAR and PUMP CO., Inc., 9203 Hudson Blvd., North Bergen, N. J.

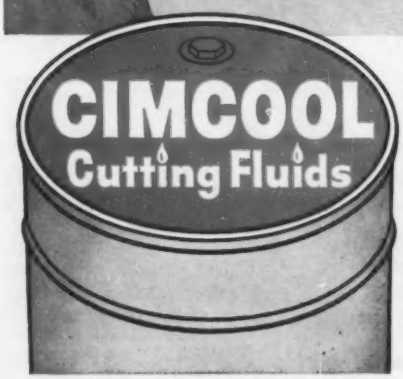
Sier-Bath PRECISION GEARS

Founded 1905 Members A.G.M.A.

•

Also manufacturers of Rotary Pumps and Flexible Gear Couplings


Production doubled–
and then some!
CIMCOOL S2 can help you reach new production highs, just as it did in this spectacular instance. Its consistent record of success has made CIMCOOL the world's best-selling chemical cutting fluid. (Company name supplied on request)
KLY PRODUCTION CHART
SALES REPORT
2
make air conditioners at this division.
The job was an automated drillhead line where cast iron compressor blocks are milled, drilled, tapped and reamed. Replaced a soluble oil with Cimcool S2 at a 1:45 dilution, in a 10,000 gallon central system. For extra rust control we added Cimplus at 1:60.
Result: production of compressor blocks increased from 167 pieces in an 8 hour shift to 400 pieces in an 8 hour shift. These records show that on some shifts production reached 715 blocks!
The system was filled with Cimcool S2 over two years ago and has since been changed only once.
Dick Riedel
Cincinnati Office



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Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U. S. Pat. Off.

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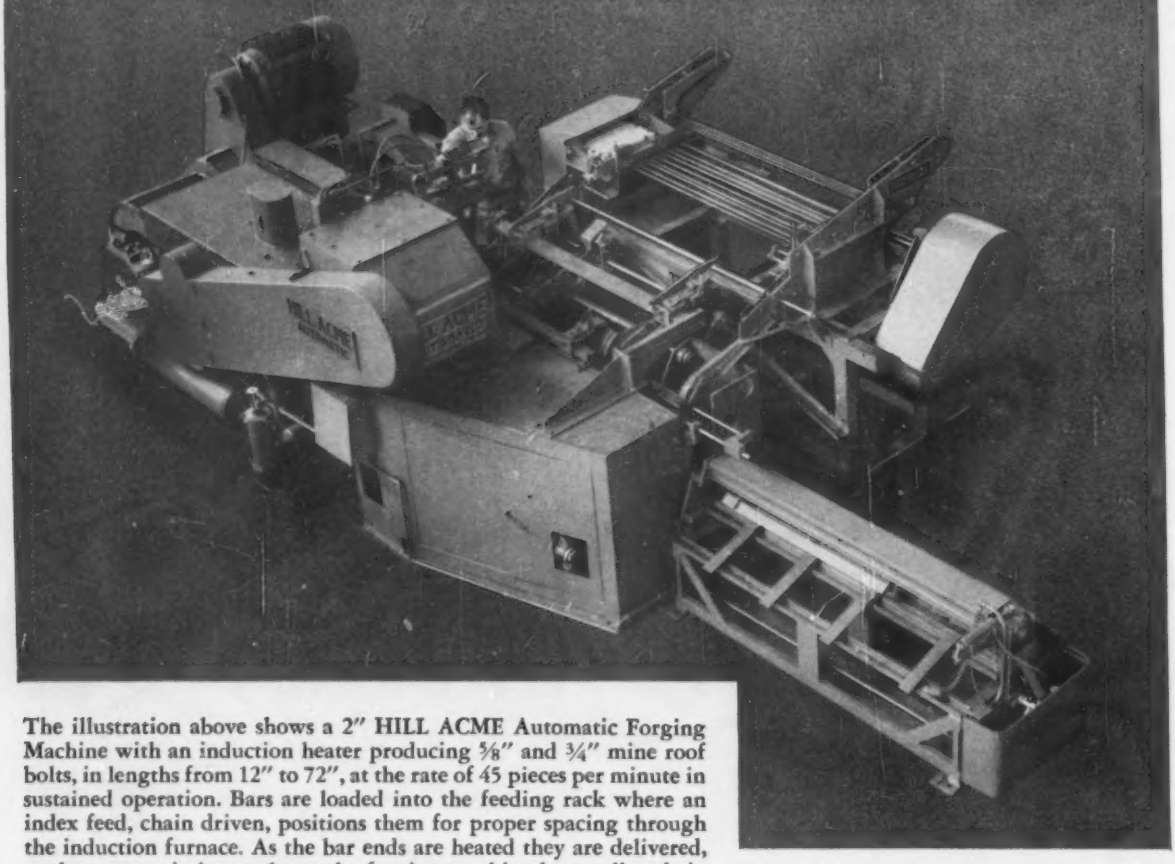
Fully Automatic
FORGING MACHINE
DELIVERS 45 PIECES PER MINUTE!



The illustration above shows a 2" HILL ACME Automatic Forging Machine with an induction heater producing 5/8" and 3/4" mine roof bolts, in lengths from 12" to 72", at the rate of 45 pieces per minute in sustained operation. Bars are loaded into the feeding rack where an index feed, chain driven, positions them for proper spacing through the induction furnace. As the bar ends are heated they are delivered, at the proper timing cycle, to the forging machine by a roller chain feed where they are gauged for length, picked up by fingers and passed progressively through the dies. Finished forgings are discharged from the back of the machine by means of a separately driven conveyor, arranged for both right and left hand discharge.

The design of this new HILL ACME AUTOMATIC forging unit does not limit the number of passes or the length of stock to be used in forging a variety of parts. Pieces longer than 36" are supported by a walking beam through the various passes.

HILL ACME AUTOMATIC forging machines are built in 1¼" to 5" capacities all of which can be automated. Your inquiry concerning high speed automatic forging equipment will receive prompt attention.

MMT-PE

The HILL ACME Company

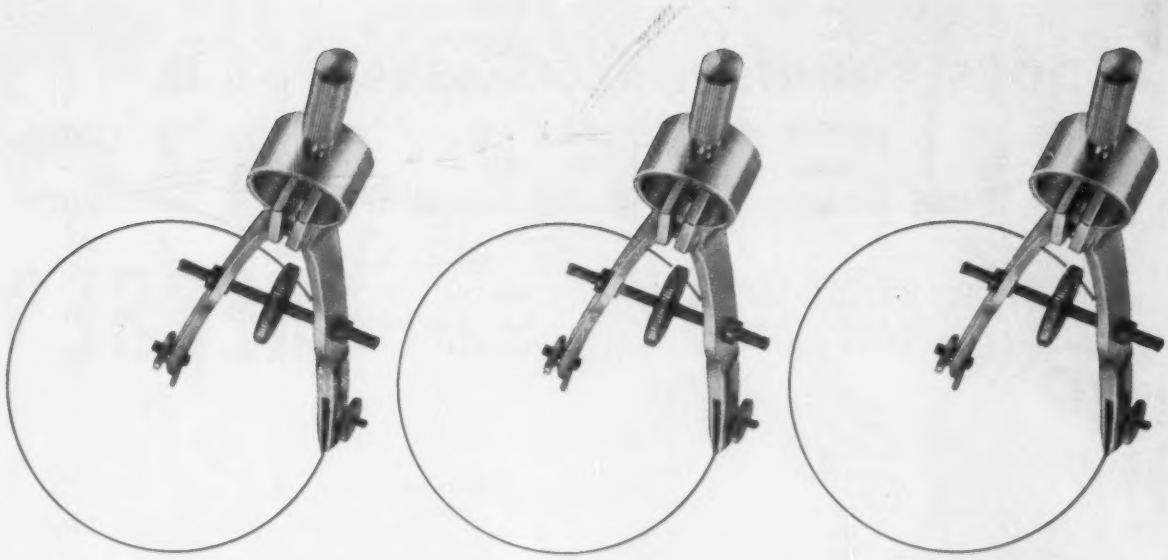
1207 W. 65th STREET · CLEVELAND 2, OHIO

HILL ACME TOOLS FOR INDUSTRY

Manufacturers of: "ACME" FORGING · TAPPING MACHINES · "CANTON" ALLIGATOR SHEARS · ROTARY SHEARS · BAR-BILLET SHEARS · "HILL" GRINDING AND POLISHING MACHINES · HYDRAULIC SURFACE GRINDERS · "CLEVELAND" KNIVES · SHEAR BLADES · MATERIAL HANDLING EQUIPMENT

We now manufacture, distribute and service the entire line of KLING metal working tools.

For more data circle this page number on card at back of book



POSITIVE DUPLICATION—EVERY TIME!

As surely as a drawing compass can produce identical circles, you can be sure of getting Positive Duplication with these CINCINNATI CENTERLESS GRINDING WHEELS—and with *all* CINCINNATI WHEELS.

This predictable uniformity is the result of Cincinnati's unique 36-step (PD)* manufacturing process. These rigid controls achieve tolerances for wheel inside diameters which are the "tightest" in the industry. Your (PD) WHEELS have better balance, require less dressing and last longer.

"PD" PAYS OFF FOR YOU

You can meet or beat demanding production schedules with the help of Positive Duplication, because you can reorder a CINCINNATI (PD) WHEEL and know that it will act and grind exactly like the original.

Whatever shape, grade and size you specify . . . centertype, centerless, internal, surface, toolroom or snagging wheel . . . you get Positive Duplication—Every Time!

CUT COSTS . . . CALL CINCINNATI

Cincinnati factory representatives are trained specialists, experienced in grinding job set-ups and operations. Their skills are at your service. Just call your CINCINNATI (PD) GRINDING WHEELS Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI® GRINDING WHEELS

*Trade Mark Reg. U.S. Pat Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

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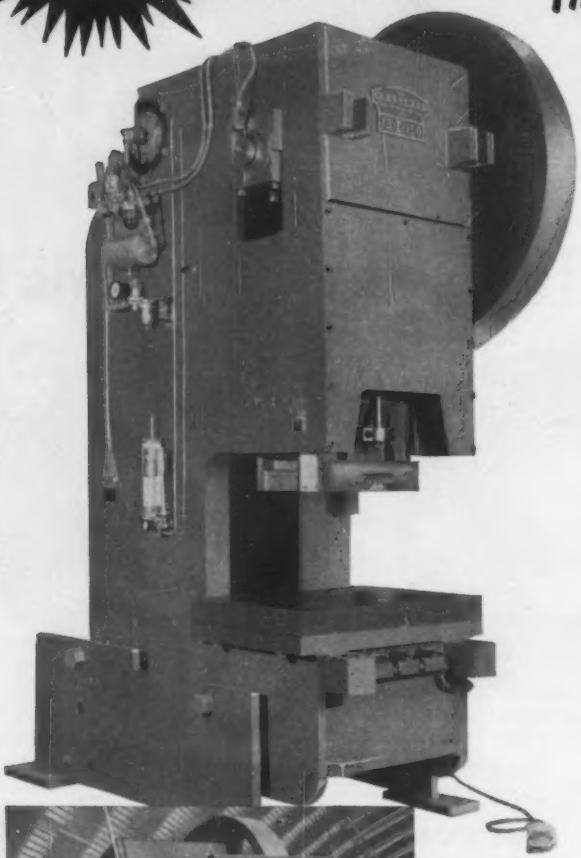
...DOES TOUGH JOBS *Dependably, Profitably*

CLEVELAND

NEW WELDED-FRAME COST-CUTTING *Open Back Inclinable* PRESSES



◀ At the Middletown Manufacturing Co. in Middletown, Ky., this new welded-frame Cleveland OBI Press is blanking and piercing ¾"-thick steel for reclining chair fixture parts and blanks for compressor cases. This Model 13-I has 150-ton capacity, 6" stroke of slide, 4" slide adjustment, 30 x 45" bed area and operates at 35 strokes per minute.

A-2848A

● Stronger structural frame—streamlined and built to withstand the shock and vibration of heavy-duty stamping.

Dies last longer with less downtime for die maintenance due to Cleveland's large box-type slide that results in greater production accuracy.

75 to 200-ton capacity, built for safer, more efficient operation with all gears and drive mechanism guarded.

Ruggedly built for many different press operations, material can be fed in from either side or from front to back.

Three different positions—vertical, 15° and 30°—to accommodate various types of dies and at the same time make use of gravity feed and discharge in automated production lines, or in operations using a single press.

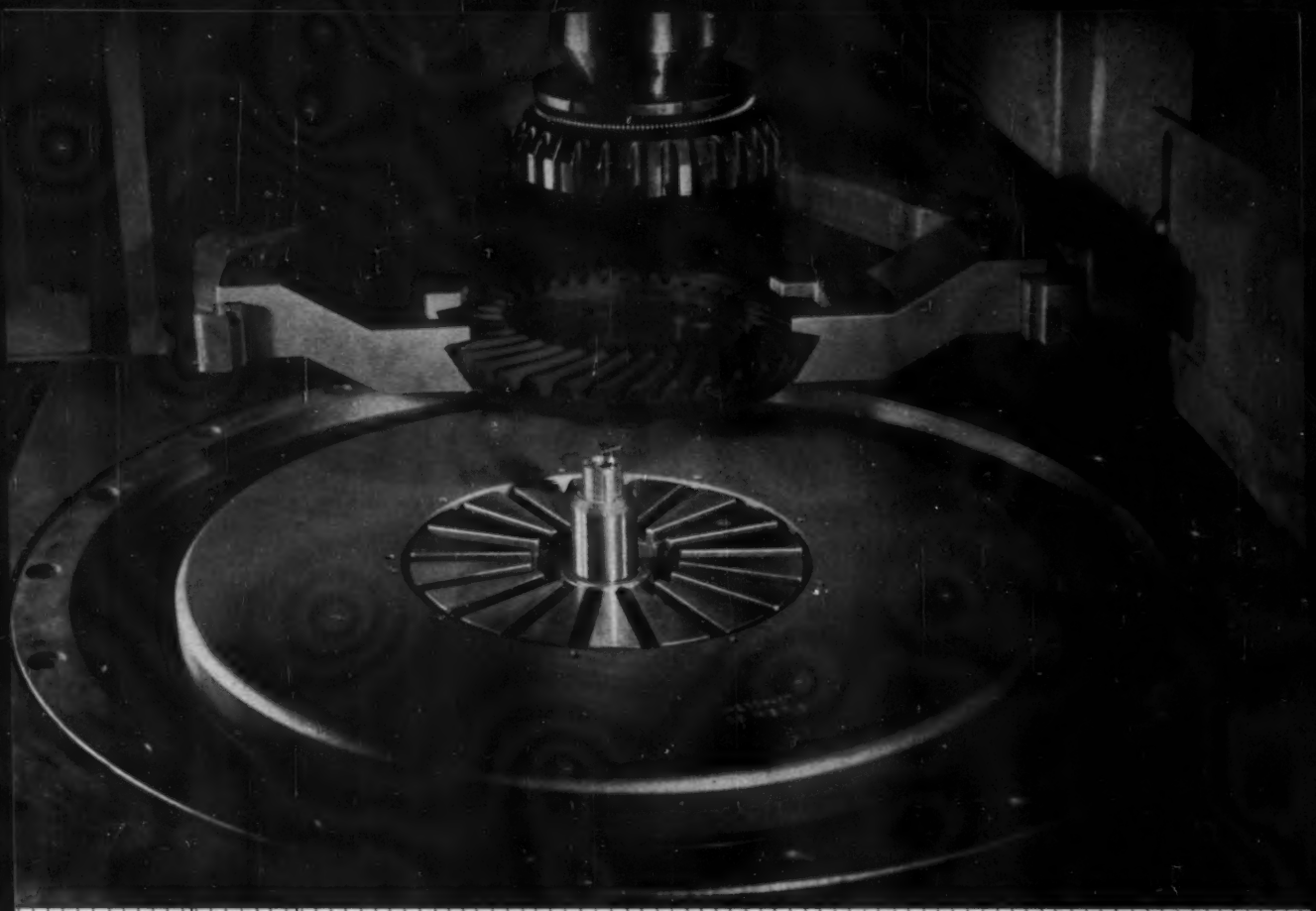
You get better stampings for less with a CLEVELAND Press—the new welded-frame cost-cutting Cleveland OBI Press.

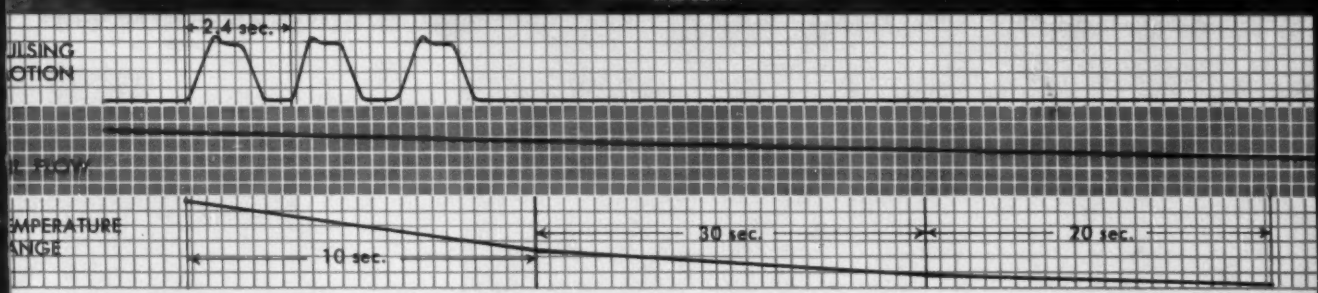
Write Today for Cleveland's OBI Press Catalog OBI 3-60

THE CLEVELAND PUNCH & SHEAR WORKS CO.
Established 1880

Power Presses
Fabricating Tools
Punching Tools & Dies

E. 40th and St. Clair Avenue, Cleveland 14, Ohio

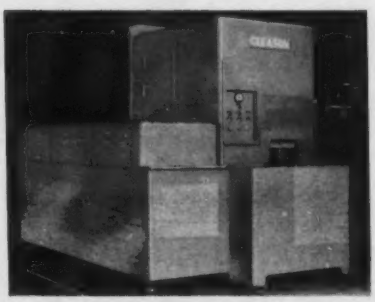




Pressure pulses during first 10 seconds of quench now assure precision parts . . . faster

Gears, clutch plates, bearing mountings and similar parts quenched on this machine will be free of residual stresses. It produces precision parts, uniformly hardened. They can be produced at a faster rate, lower cost.

The new Gleason 509 Quenching Machine consists of a *basic* quenching press which can be arranged for automatic feeding and discharge. It handles flat parts up to 10½″ in diameter by 4″ high. It can be modified to take parts 8″ high.



HOW IT WORKS Pressure on the work is momentarily released and reapplied so that the part can contract normally as it cools without developing stresses caused by die contact. Hardening is more uniform.

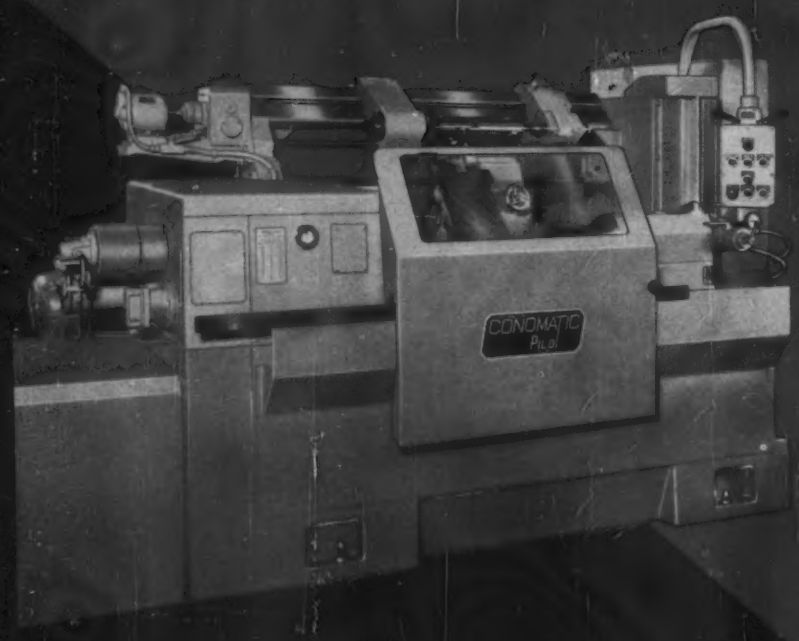
ADVANTAGES The pulsing cycle, plus controlled oil flow, gives more control over the quench, so that parts can be removed more quickly. By use of automatic handling equipment, quenching can be done three times as fast as with manual types of equipment. All operations on the 509 are controlled by simple timers and push buttons. Dies are changed easily and quickly.

Please write for detailed information on operation and specifications.

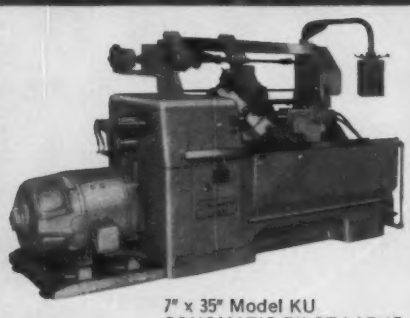
GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

A CORDIAL



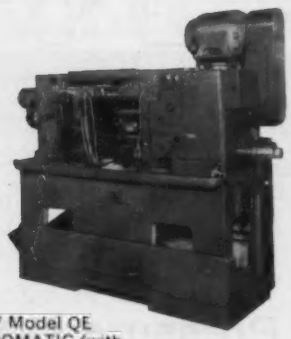
The CONOMATIC PILOT
10" x 35" Model KU
An economical, efficient, fully automatic copying lathe. Produces a variety of work with great accuracy and exceptionally good finish.



7" x 35" Model KU
CONOMATIC PILOT LATHE

See these TWO at CHICAGO!

...see all EIGHT



9/16" Model QE
CONOMATIC (with
Magazine Feed)

The Model QF 9/16"
6-Spindle BAR CONOMATIC
Designed to give better accommodation, support and maintenance to tools and work up to 9/16" dia.

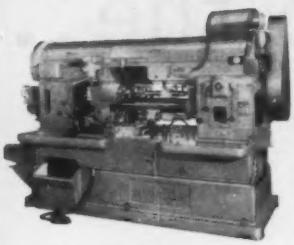
MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY

BOOTH NO. 1215

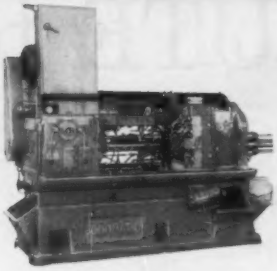
INVITATION FROM CONE AUTOMATIC...

You will be most warmly welcome at the CONE Booth, No. 1215, NMTBA Exposition, Chicago Amphitheatre, September 7-10. Here, you will see thoroughly demonstrated the profitable production features of two outstanding CONOMATICS.

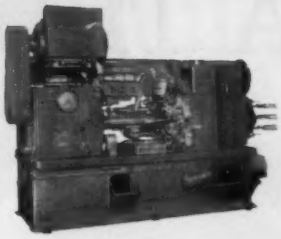
Although these machines excel in the ranges of work for which they are designed, they are only a token representation of the quality and depth of machining service provided by the entire CONOMATIC line.



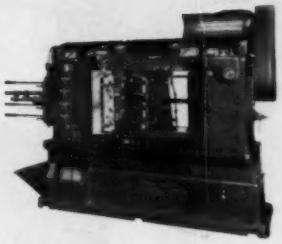
5⅞" Model TE
CONOMATIC



1" Model TS Bar
CONOMATIC



1⅝" Model TF Bar
CONOMATIC



1½" Model DP 4-HI Bar
CONOMATIC

CONOMATICS in action at the permanent display at WINDSOR

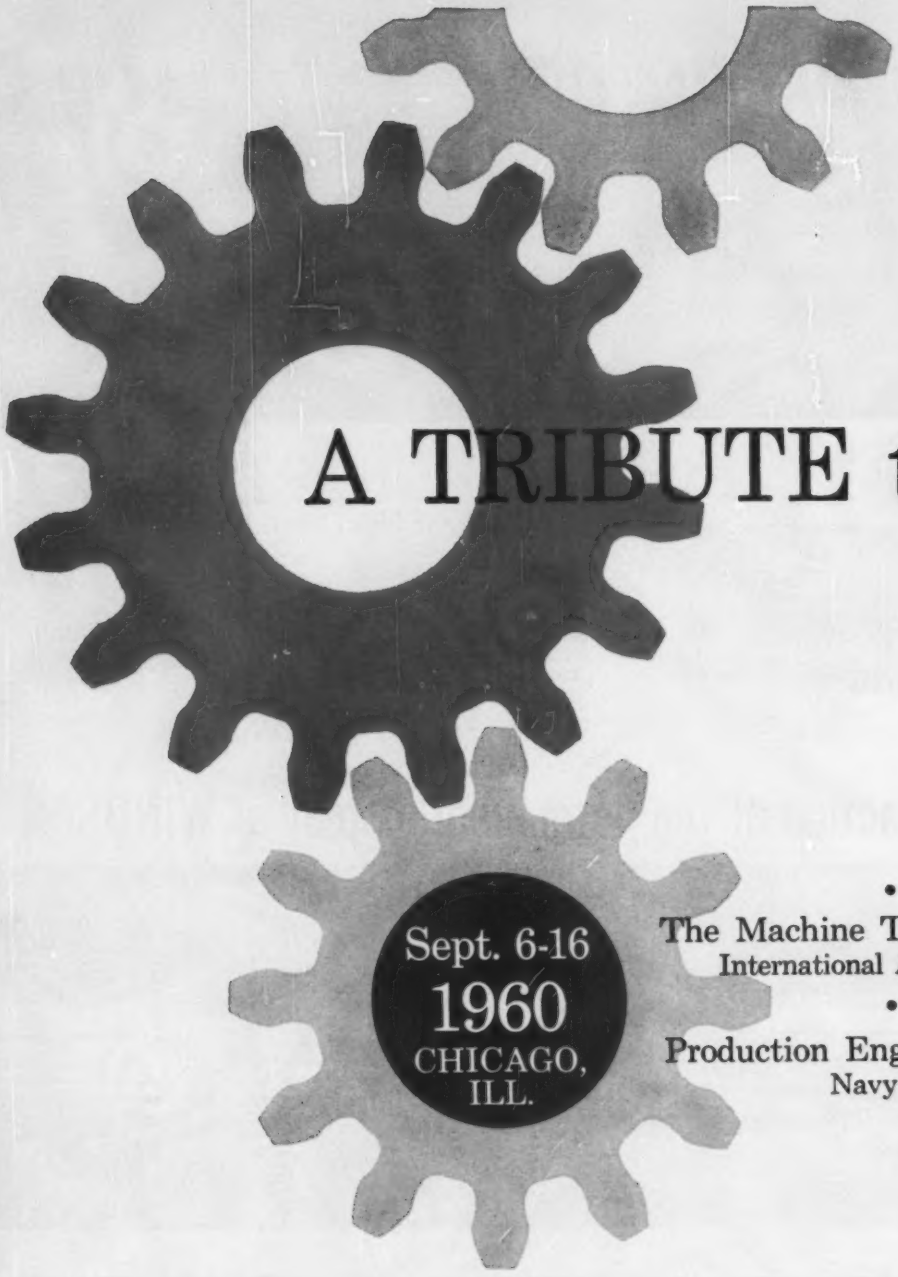
The home of CONE AUTOMATIC MACHINE CO., INC., at Windsor, Vermont

For those whose interests require more deliberation for machine analysis and comparison than the conditions at a large equipment show permit, Cone — at its Windsor, Vermont plant — has prepared a permanent type of CONOMATIC Exhibit that more completely presents all of the top features of the "World's Most Productive Line of Automatics". Here, you may see in action the capabilities of a single model, or a group of models, and minutely examine them in the light of your own specific requirements.

Cone will be delighted to supply travel information, and arrange for comfortable accommodations.

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
Windsor, Vermont



•

The Machine Tool Exposition
International Amphitheatre

•

Production Engineering Show
Navy Pier

CYLINDRICAL and THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

. All of us owe a debt of gratitude to those who have worked so hard to perfect new machinery and to create time-saving features for showing at the Chicago Expositions!

. . Machine Tool Builders of America!

Little do we realize the coordinated ingenuity and many extra hours required to meet this deadline . . . yet, the machine tool builders of America will not let us down — they again, will help to protect our peace-time economy and defense with facilities for bigger, better and more effective production!

A word to the wise . . . the efficiency of your machine tool investment is protected when you use the best cutting tools and attachments available!

You buy the best when you buy BATH TAPS and GAGES

John BATH & Co., Inc.

44 Mann Street, Worcester, Massachusetts

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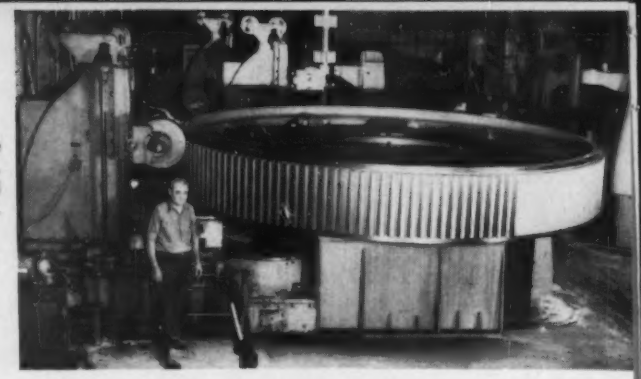


Big gear hobbing jobs like this one are everyday jobs for Chicago Gear. STANICUT Oil 208 BCS is the cutting oil used in all gear manufacturing machines.

Chicago Gear Mfg. Company tames tough steels, cuts costs with STANICUT Oil 208 BCS

Tames tough steels. Gears from one to 300 inches in diameter are machined by Chicago Gear. Steels up to 375 Brinell hardness are worked. STANICUT Oil 208 BCS helps them do it. STANICUT 208 contains maximum amounts of sulfur, chlorine and compounding to make it suitable for handling tough alloy steels. It is viscous enough to stay on big tools and work pieces, yet fluid enough to flow over the work in sufficient volume to assure good cooling.

Cuts costs. STANICUT Oil 208 BCS is used at Chicago Gear for all gear hobbing operations and for all other applications requiring a straight cutting fluid. There's no chance of the wrong fluid being used, thus no costly losses. One fluid cuts down inventory, saves time in keeping track of stocks, cuts paper work handling and ordering.

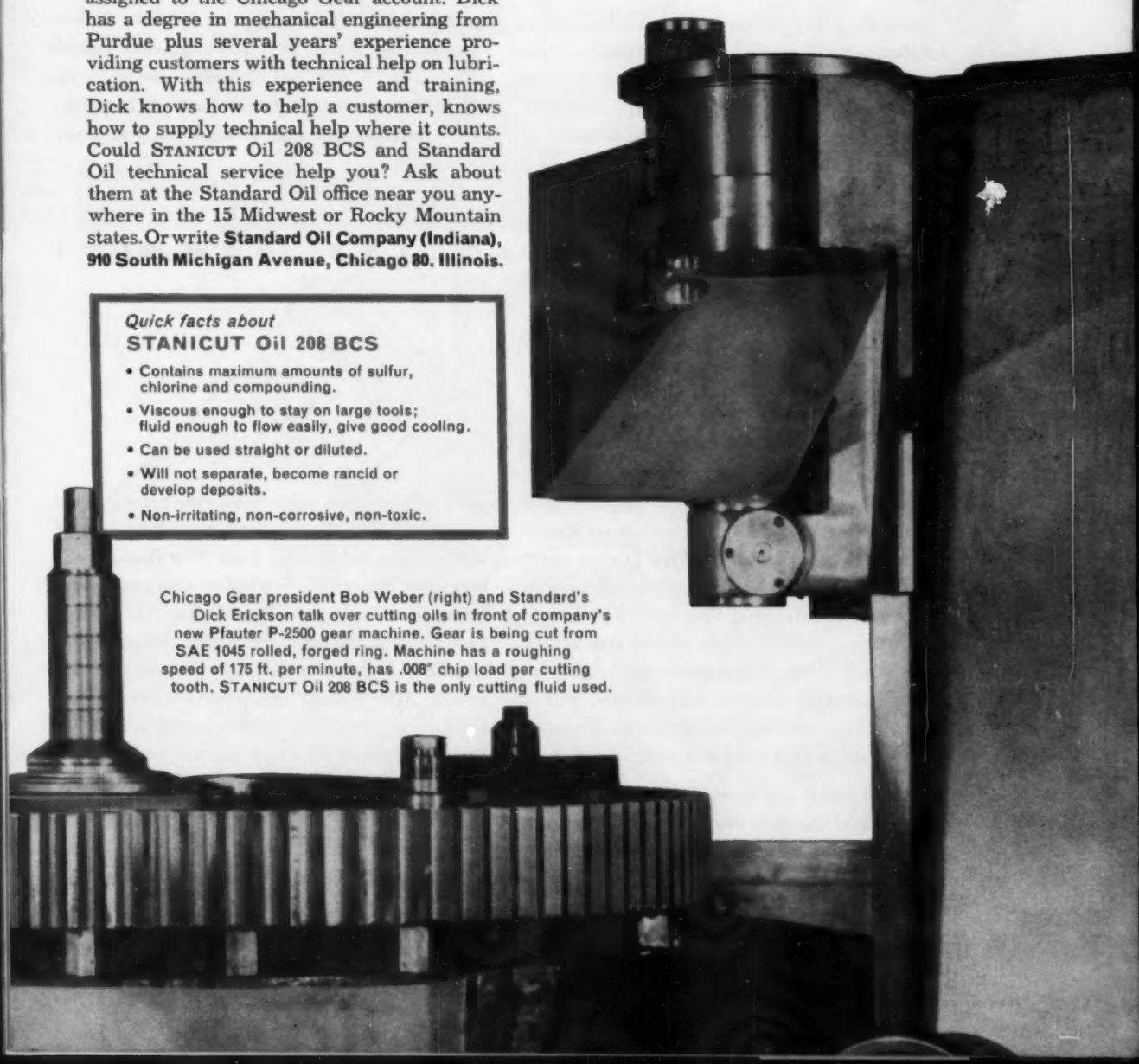
Gets service. Standard Oil's Dick Erickson is assigned to the Chicago Gear account. Dick has a degree in mechanical engineering from Purdue plus several years' experience providing customers with technical help on lubrication. With this experience and training, Dick knows how to help a customer, knows how to supply technical help where it counts. Could STANICUT Oil 208 BCS and Standard Oil technical service help you? Ask about them at the Standard Oil office near you anywhere in the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

STANDARD

You expect more from Standard and you get it!

Quick facts about
STANICUT Oil 208 BCS

- Contains maximum amounts of sulfur, chlorine and compounding.
- Viscous enough to stay on large tools; fluid enough to flow easily, give good cooling.
- Can be used straight or diluted.
- Will not separate, become rancid or develop deposits.
- Non-irritating, non-corrosive, non-toxic.



Chicago Gear president Bob Weber (right) and Standard's Dick Erickson talk over cutting oils in front of company's new Pfauter P-2500 gear machine. Gear is being cut from SAE 1045 rolled, forged ring. Machine has a roughing speed of 175 ft. per minute, has .008" chip load per cutting tooth. STANICUT Oil 208 BCS is the only cutting fluid used.

Open secret of New Britain superiority

Wide-open design makes the most fundamental difference between a New Britain automatic chucking machine and other machines. It speaks for itself as a means of getting at the tooling, making adjustments and clearing chips.

Massiveness, right from the floor up, is equally apparent and equally important in chucker work. You see it in the way the cutting tools make the heaviest cuts with a chatter-free smoothness that can't be duplicated.

Only New Britain provides a combination of longitudinal with transverse forming motion where needed. This versatility eliminates the need for second operation machines in many cases—particularly when a job is setup for double indexing for fast two-at-a-time production.

New Britain spares no pains to incorporate every new development to make chucker-type machining more profitable. The open-end design lends itself particularly well to magazine loading and unloading, for example, and many New Britains are being equipped to provide this feature.

Whenever a number of operations are required on cast or forged pieces, these massive, rugged, powerful machines offer great possibilities for savings through faster, more accurate, more reliable production. A new and complete catalog on the New Britain chucker line is just off the press. We would be very glad to send you your copy.

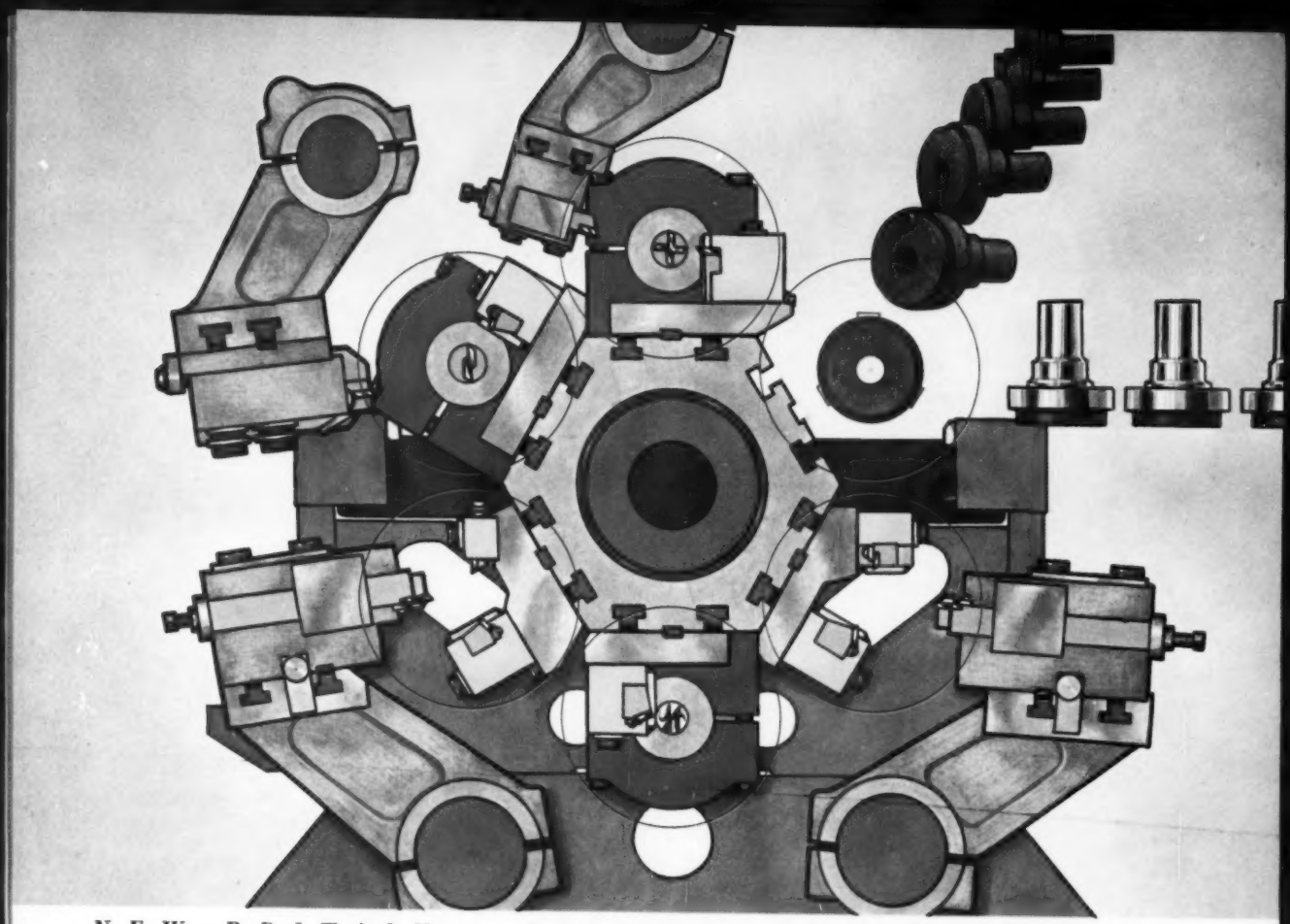
THE NEW BRITAIN MACHINE COMPANY

New Britain's answer to a serious threat

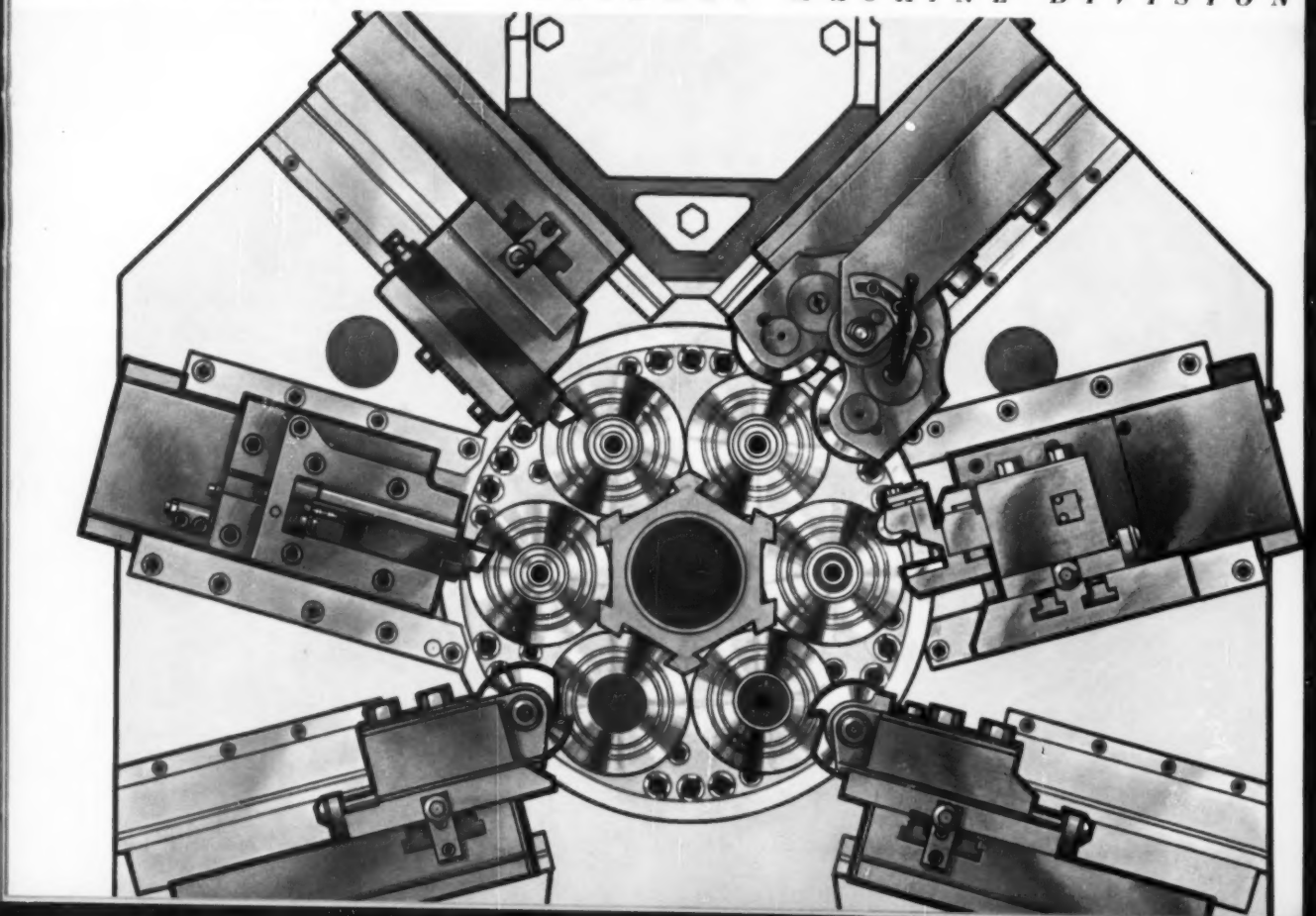
Overseas production of just about anything you care to name is making serious inroads on American domestic and foreign markets. It's no secret that European and Asian industry is catching up fast technologically—and they have a real competitive advantage in plenty of low cost skilled labor. While many foreign products are still inferior to those of domestic manufacture, this is far from true in all cases. The answer is, of course, increased productivity at lower cost.

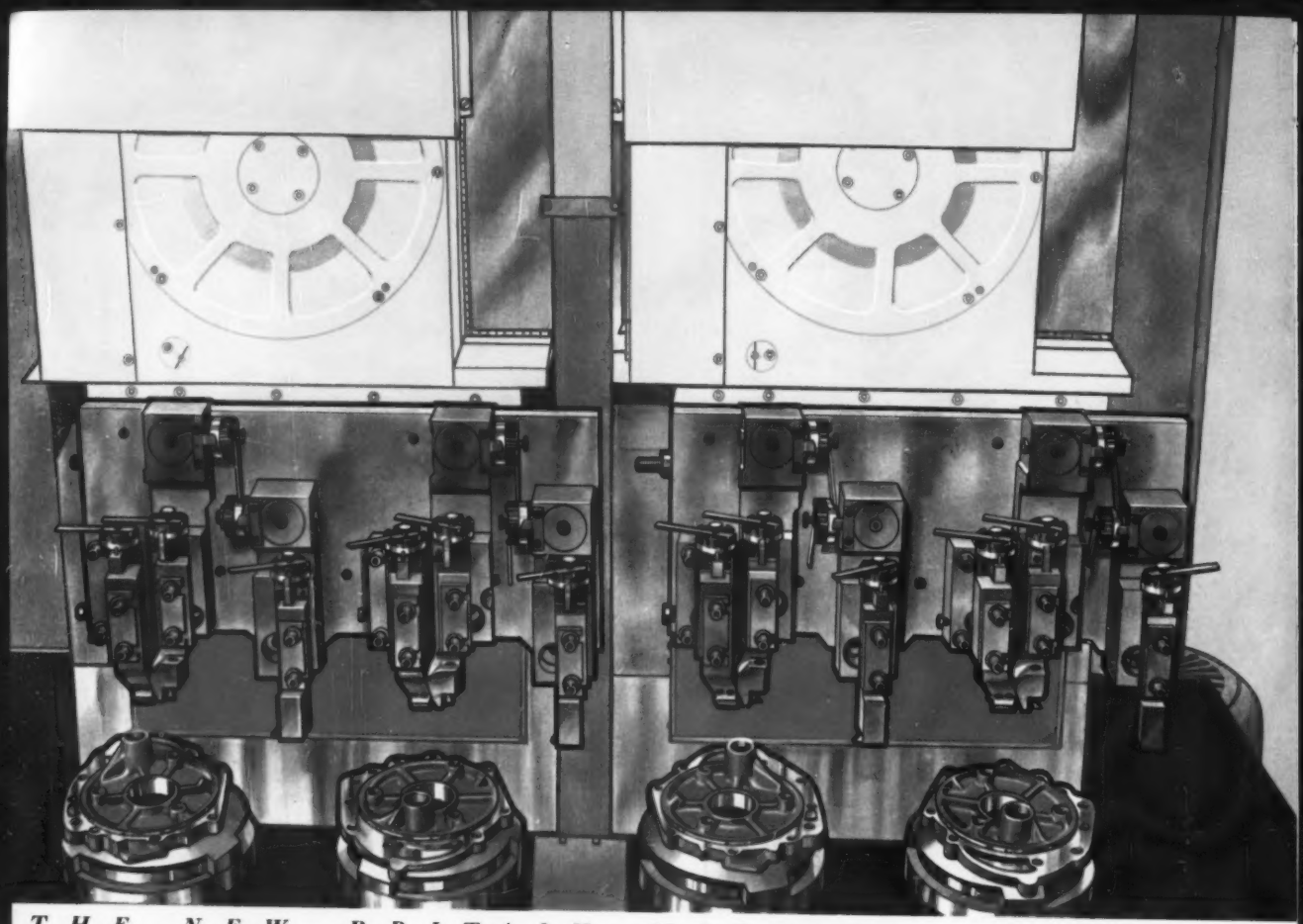
In its all-new line of bar machines, New Britain has developed the most modern bar-turning units available. Five models in two different series are offered with capacities from 1¼" to 5⅛". These machines are designed for really fast, trouble-free, high-precision production. More operations per machine are possible than ever before. Wide open tool areas allow unlimited combinations of end working and forming tools. New Britains will stay new longer. The exclusive wear-preventing features so familiar to New Britain users have been retained and improved. Catalogs on both the small and large series machines are yours for the asking. After looking this literature over if you think one or more New Britains may help improve your competitive situation, we will be happy to review your prints and arrange a demonstration. No obligation, of course. Call us or call your local representative.

New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

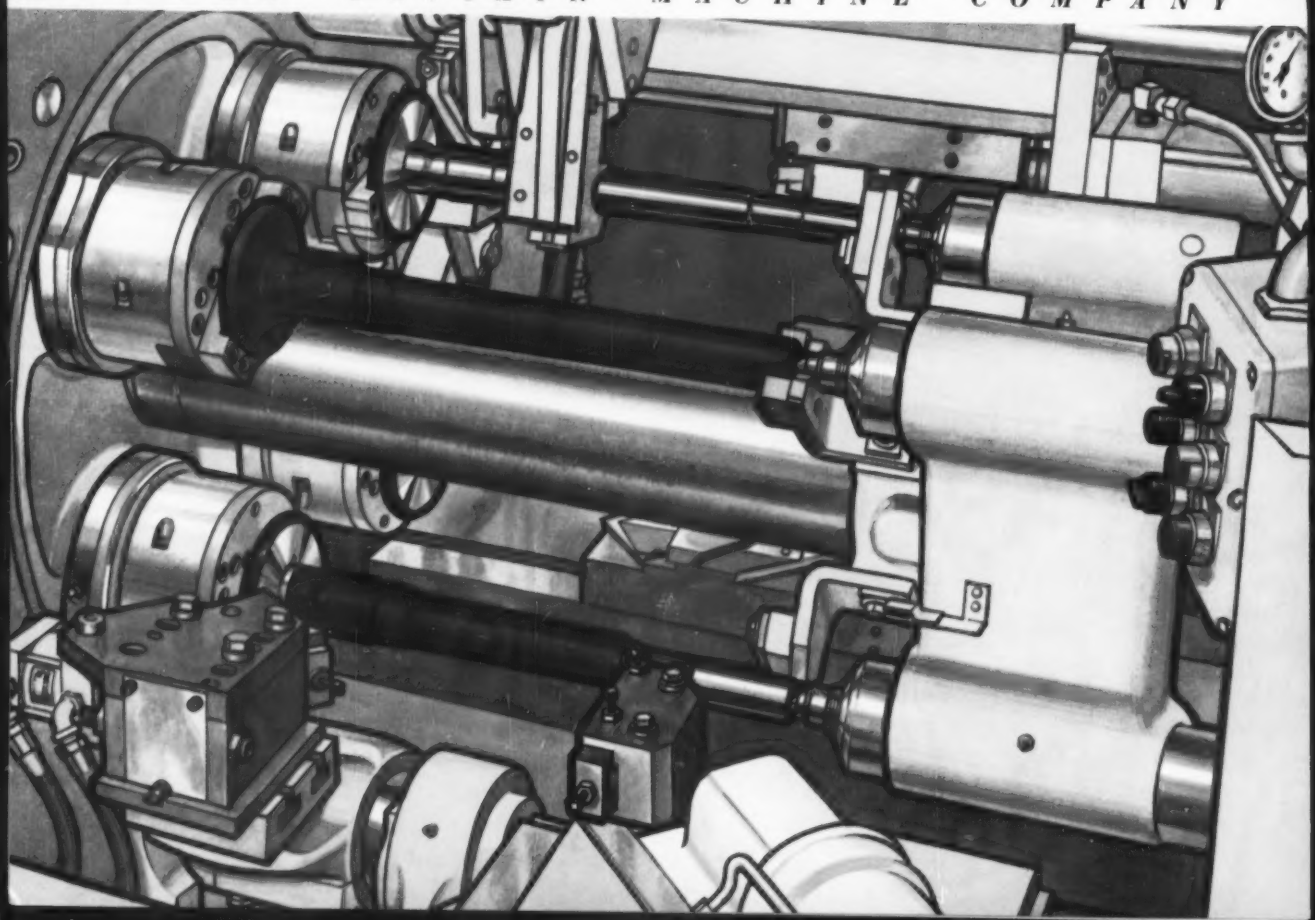


NEW BRITAIN · GRIDLEY MACHINE DIVISION





THE NEW BRITAIN MACHINE COMPANY



Precision boring
New Britain's new approach

New Britain Cam Actuated Vertical Precision Boring Machines offer an entirely new principle for more accurate boring and turning, plus compact exterior design and fast tooling. Rough cuts and finish cuts within close tolerances on the same set-up are characteristic. Standard models are available with maximum swing from 12″ to 17¾″ in 10 or 15 horsepower.

Here are a few of the major new developments incorporated in these unusual machines.

Greater accuracy. Both the vertical and cross slide cams are mounted on a common shaft which is contained inside the vertical slide. The linkages found in conventional cam-operated contouring machines are eliminated. Both the vertical and cross slides ride on preloaded roller bearings and are deflection-free.

Clean-sided design. Any number of these self-contained machines, each with one or more spindles, can be arranged side by side. Depending on how they are tooled, they operate either as a single unit or as individual machines. Parts can be inverted on adjacent machines or on adjacent spindles of the same machine, finishing both sides, completing *all* operations in one integrated, high-volume operation.

Fast tooling. Unrestricted accessibility allows rapid tool and cam changes.

Complete catalog material is available.

NEW BRITAIN - GRIDLEY MACHINE DIVISION

Idea for volume producers of shafts

Economists are making startling predictions on this year's increase in productivity. They say it will be twice that of recent years—up as high as 10% in some manufacturing industries.

Whether or not these predictions come to pass, it's certain that it won't happen in plants using outdated equipment.

Shaft work is a problem to many firms. New Britain pioneered template-controlled contour turning and boring, solving the problem for many progressive companies. Now for the manufacturer with really high volume requirements we present Model 412/25–a four-spindle, template-controlled machine capable of producing a four-fold increase in productivity per man hour.

The basic principle pretty much speaks for itself. As in the case of the single-spindle contour lathe, inexpensive metal templates control the full cycle and re-cycle if required. Simple, single-point tools replace complex gang tooling. Setup is simple and fast. When tools wear, merely replace them. Since all relationships are maintained by the template, tool replacement involves no problem.

When the volume of contour turning warrants it, this machine can be the best money maker on the production floor. Your New Britain representative can quickly tell you after looking at your prints and learning of your production requirements. Meanwhile, we would be glad to mail you descriptive literature containing the basic facts and specifications. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

For more data circle this page number on card at back of book

WINTER ROCKET* TAPS

FOR CHIPLESS FORMING OF INTERNAL THREADS

*Patent No. RE 24,572

WINTER

Winter Brothers fluteless 'Rocket' Taps produce superior internal threads in materials such as aluminum, brass, copper, ductile steel and die castings by chipless forming rather than by cutting. Resulting threads are extremely accurate with an excellent burnished finish and maximum strength characteristics.

Because 'Rocket' Taps actually displace metal without removing it, no chips are formed to clog flutes and cause tap breakage. Blind hole tapping is easier, faster. The absence of a cutting action virtually eliminates resharpening and assures longer tool life. A stronger thread structure is produced by compression and hardening of the metal without breaking surface fiber grains.

Stocked in all popular tap sizes, 'Rocket' Taps are available in both plug and bottoming styles from your local Winter Distributor. Call him today for complete information on this newest, cost-cutting tool from Winter Brothers. Or, write for our free, informative brochure on 'Rocket' tapping.

WINTER BROTHERS COMPANY • ROCHESTER, MICH.
Distributors in principal cities. Branches in New York
Detroit • Chicago • Dallas • San Francisco • Los Angeles

CHOOSE FROM WINTER'S WIDE LINE OF TAPS, DIES AND GAGES

CALL YOUR WINTER DISTRIBUTOR

NATIONAL GUN DRILLS

FOR QUALITY HOLES

*Patent No. 2,418,021

NATIONAL TWIST DRILL & TOOL CO. ROCHESTER, MICH., U.S.A.

CENTER-CUT TYPE

TARGET TYPE

National

Target Gun Drills, products of National's intensive research program, permit straighter, deeper drilling to closer tolerances than ever before. A solid core is formed that acts as a continuous center guide in the hole being drilled. Drilling performance and accuracy are vastly improved.

Center-Cut Gun Drills provide peak cutting efficiency on certain applications such as blind-hole and interrupted-hole drilling.

Gun Drill Shanks, both tubular and solid types, are of special alloy steel heat treated to a tensile strength of 194,000 psi. They provide extra-long drilling life without twist or "wind up", even at higher speeds and feeds.

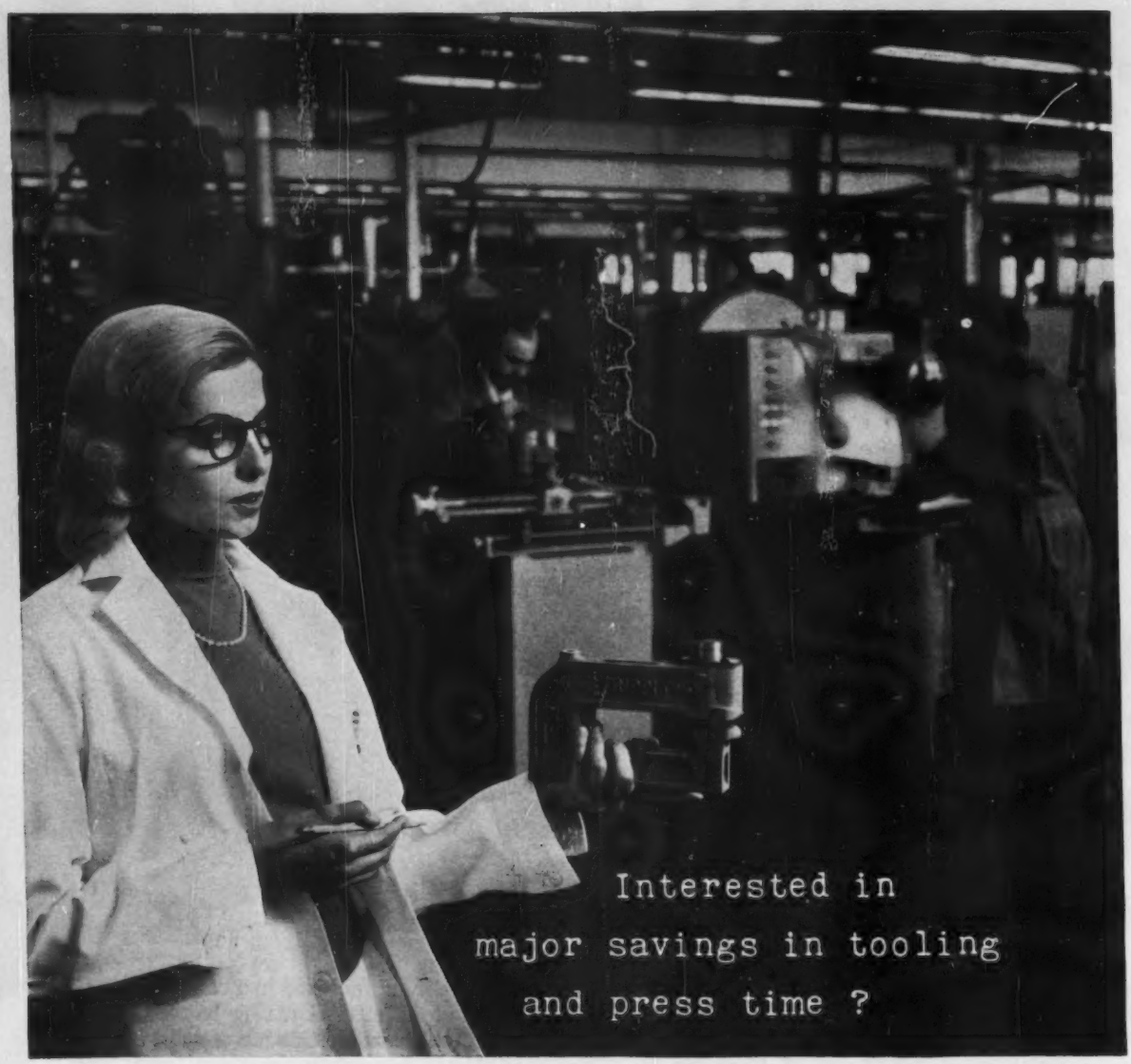
Gun Drills are manufactured in a complete range of standard stock sizes. Cutting heads of high speed steel, with carbide tips, or of solid carbide are available in brazed-on construction, as well as with National's convenient Quick-Change feature for fast resharpening and replacement. Gun Reamers, Controlled Core Gun Drills, Sharpening Fixtures and Point Checking Gages are also manufactured by National, your only source for tools *plus!*

NATIONAL TWIST DRILL & TOOL COMPANY
ROCHESTER, MICH.
Distributors in principal cities. Branches in New York
Detroit • Chicago • Dallas • San Francisco • Los Angeles

*JUST TWO OF NATIONAL'S PARADE OF PLUS PRODUCTS

TWIST DRILLS • REAMERS • COUNTERBORES
END MILLS • MILLING CUTTERS • HOBS • GUN DRILLS
GUN REAMERS • CARBIDE and SPECIAL TOOLS

CALL YOUR NATIONAL DISTRIBUTOR



Come to STRIPPIT - Booth 340 at Chicago's Navy Pier

You'll get a fresh slant on ways to work metal when you visit the Production Engineering Show in September. Stop by the STRIPPIT booth and see how our self-contained punching units eliminate expensive dies, how the Flex-O-Drill sharply reduces template making time, how our versatile Fabricators simplify pilot and production runs.

SELF-CONTAINED HOLE PUNCHING UNITS reduce tooling to a simple assembly operation. Punches, stripping guides and die buttons are component parts of the unit. Nothing's attached to press ram. No die set required!

STRIPPIT FLEX-O-DRILL (left) speeds production of accurate templates and layouts. A table-top precision machine for drilling, reaming, center punching and scribing, Flex-O-Drill does away with need for base-line drawings or vernier height gauges. Handles ¼" material up to 24" wide and in any length. STRIPPIT MODEL 15A FABRICATOR (right), the latest model of one of industry's most versatile sheet metalworking machines, features the new Strippit Electro-Hydramatic Head for controlling the stroke. The time-saving Fabricator punches any sheet material up to ¼" thick, notches and nibbles up to ⅛" thick material.

If you can't make the show, be sure to write for the General Catalog explaining the STRIPPIT System.

WALES **STRIPPIT** INC.

203 Buell Road Akron, New York

In Canada: Strippit Tool & Machine Company, Brampton, Ontario, In Continental Europe: Raskin, S.A., Lausanne, Switzerland; In the British Isles: E.H. Jones, (Machine Tools) Ltd., Hove, Sussex, England.

NEW!

THE SHAPE OF THINGS TO COME

Model 624 Automatic Face Mill Grinder

Model 600 Drill Grinder with Manual or Automatic Infeed

A visit to Oliver's Booth 342 at the Machine Tool Exposition will reveal how your tool and cutter grinding practices can be made more compatible with modern production machining requirements.

Eleven Oliver machines under power will be demonstrated for you. Four of these are grinders which have not been exhibited before. Thus, you will have an initial opportunity to view "The Shape of Things to Come."

Oliver specialists will be pleased to show you the fastest and most accurate grinding method available today for sharpening drills, reamers, single point tools, hobs, spot facers, milling cutters, face mills, end mills, counterbores, routers, circular metal or wood saws, or similar tools.

OLIVER of ADRIAN

1410 E. Maumee St. • Adrian, Michigan

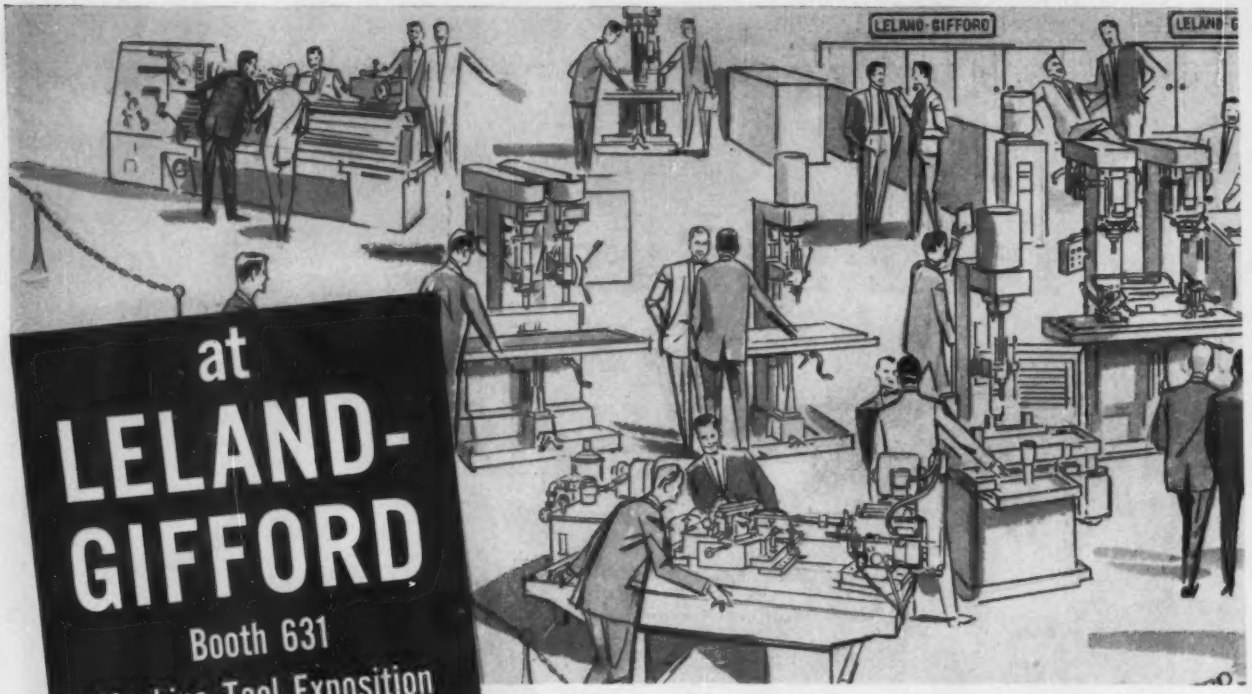
DRILL GRINDERS AND THINNERS

TOOL AND CUTTER GRINDERS

AUTOMATIC AND MANUAL FACE MILL GRINDERS

TOOL BIT GRINDERS

CONTOUR SAWING AND FILING MACHINES



WE'RE SHOWING MORE THAN EVER BEFORE

Put Leland-Gifford Booth No. 631 at the top of your Machine Tool "must" list. You'll see a major display of up-to-the-minute drilling machines and other machine tools . . . plus seven outstanding new developments that rate your highest interest and consideration.

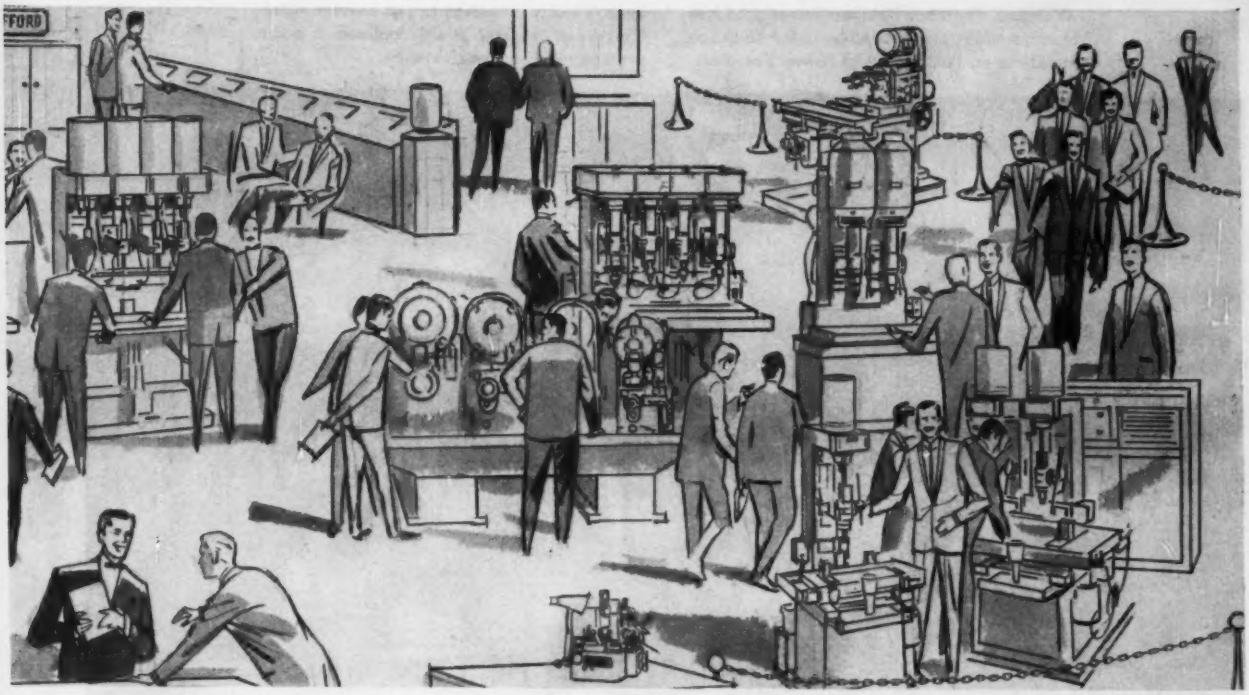
Every machine will be set up and operating and the booth will be fully staffed with engineers who know the machines and how to apply them to your production problems.

THE MACHINE TOOL EXPOSITION —1960

MMTPE

Sept. 6-16
CHICAGO, ILL.

✻ *If you can't make the show, we'll be glad to send complete information on these important new developments.*



7 MAJOR NEW DEVELOPMENTS

NEW TAPE CONTROLLED "HOLE LOCATOR" FOR PRINTED CIRCUIT BOARDS

Designed especially to speed and improve production of electronic circuit boards. This two-spindle HOLE LOCATOR with punched tape control and self-contained automatic feed drilling units will position and drill up to 100 holes per minute.

NEW GENERAL PURPOSE TAPE CONTROLLED PRECISION "HOLE LOCATOR"

Adds punched tape automatic table positioning to the proven ability of the Leland-Gifford HOLE LOCATOR to locate and drill precision holes in a wide variety of production work.

NEW EIGHT INCH HORIZONTAL GUN DRILL

This new 8″ stroke hydraulic feed horizontal gun drill is column mounted to facilitate work positioning and to simplify fixturing when used for producing multiple holes in a single part.

NEW TWENTY-FOUR INCH GUN DRILL

Features lead screw feed synchronized to and governed by spindle speed. Speeds are readily changed by a quick sheave change and feeds by pick-off gears.

NEW NO. 1MVB MULTIPLE SPINDLE DRILLING MACHINE

Provides almost unlimited speed range and extreme sensitivity at comparatively low cost. V-belt driven from standard NEMA motors and capable of speeds up to 10,000 rpm.

NEW NO. 2LVS MEDIUM DUTY DRILLING MACHINE

Offering continuous speed range from 100 to 3,000 rpm through variable speed drive and back gears.

NEW "DRILL POINT MASTER" DRILL SHARPENER

A completely new concept in a precision twist drill grinder that will produce or reproduce a drill point of any specified geometry on drills from #80 to .250″ diameter. Precise adjustments control locating, indexing, point angle, relief angle and point thinning. Built-in microscopic viewers assist n setting and inspection.

PLUS A COMPREHENSIVE DISPLAY OF THE COMPLETE LELAND-GIFFORD LINE

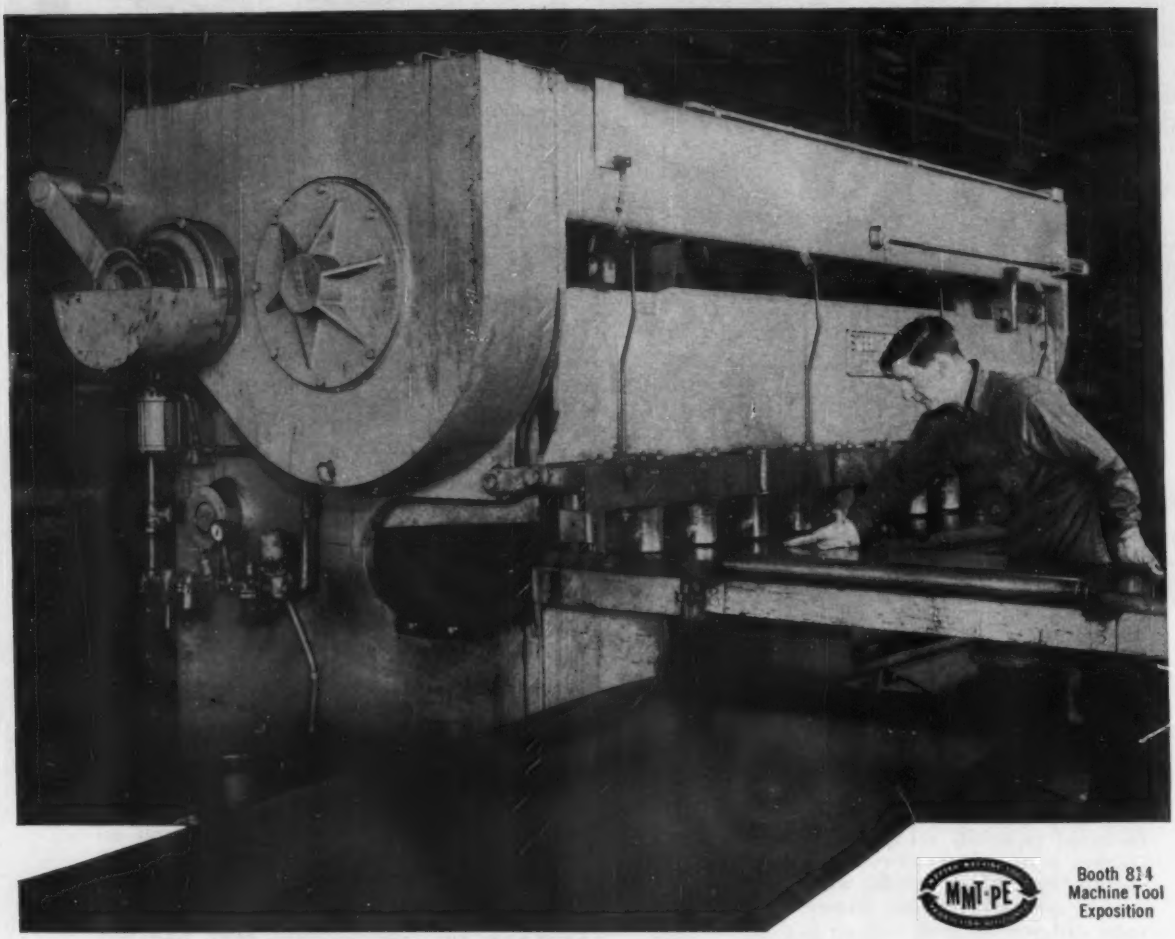
. . . including multiple spindle drilling machines, self-contained drilling units, standard "Hole Locators", lathe tracer attachments and drill jig bushings.

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS

For more data circle this page number on card at back of book

.002 inch clearance between knives produces sharp, straight, accurate edges in the 18 gauge metal cut on this Steelweld Shear. The clearance is easily increased to suit heavier metal. The shear operator is not confined to some average compromise clearance.



MMT·PE

Booth 814
Machine Tool
Exposition

Cuts 1200 PIECES Per Hour

Farm Equipment Manufacturer Gets Sharp, Accurate Cuts Because of Steelweld's Exclusive Knife Clearance Adjustment

MASSEY-FERGUSON, Ltd., Toronto, well known throughout the world as a leading manufacturer of farm implements does much of the cutting required for the various steel parts with Steelweld Shears.

Massey-Ferguson obtains the best possible cuts because the knife clearance can be adjusted exactly to suit the thickness of metal being cut. It is not necessary to depend upon some compromise difficult-to-change knife setting with Steelweld Shears, as they are easily adjusted to the correct clearance in 10 seconds.

Illustrated is one of the many cutting jobs for which Steelwelds are used. 108-inch lengths of 18 gauge steel are cut into six 18-inch pieces at a rate of 1200 per hour. Knife clearance setting for this work is .002 inch. This shear has been in operation 24 hours a day, six days a week, for many years.

Write for free copy of catalog No. 2011

STEELWELD

PIVOTED BLADE **SHEARS**

Steelweld Machinery includes: Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 5456 E. 282 ST. • WICKLIFFE, OHIO

For more data circle this page number on card at back of book

16 exceptional quality British-made PRECISION MACHINE TOOLS

presented by LAPOINTE at the

2nd COLISEUM Machinery SHOW

Chicago Coliseum, Sept. 7-15, 1960
(near the Loop)

A working exhibit...
every machine under power!

INDEX

Super Shaper
Openside Crank Planer
Chucking Lathe
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Automatic Internal Grinder
Surface Grinder
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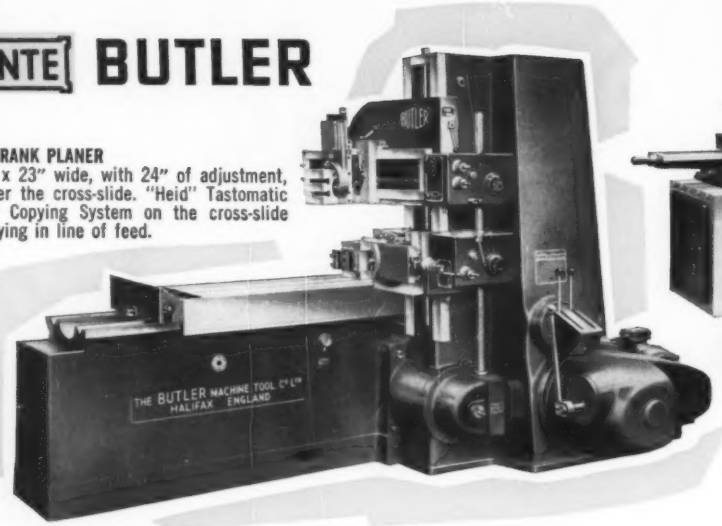
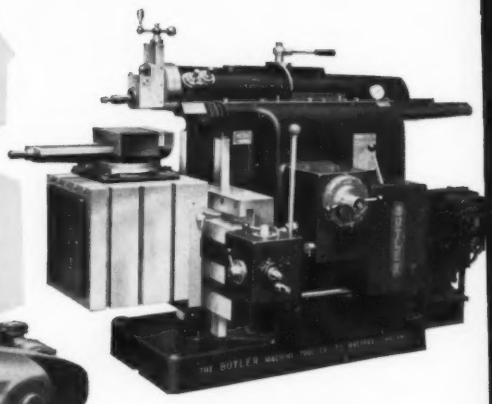
Gear Planer
Universal Milling Machine
Automatic Copy Die Sinking Machine
Radial Drill
Horizontal Boring Machine
Rotary Positioner with Numerical Control

pictures inside ➡

LAPOINTE BUTLER

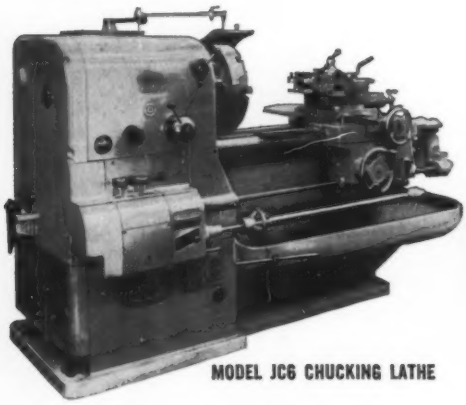
36" OPENSIDE CRANK PLANER
Table, 48" long x 23" wide, with 24" of adjustment, admits 24" under the cross-slide. "Heid" Tastomatic Electro-Magnetic Copying System on the cross-slide tool-box for copying in line of feed.





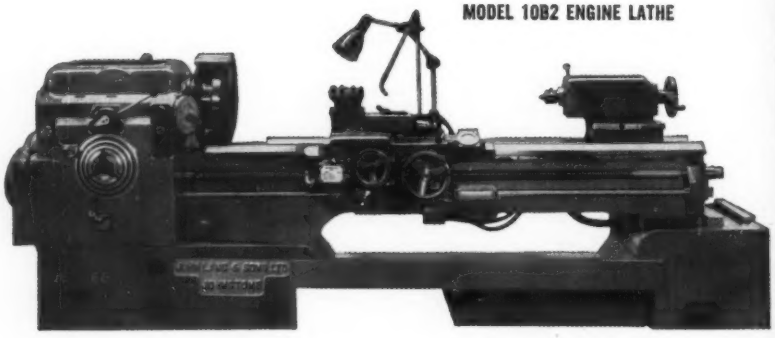
18" SUPER SHAPER

LAPOINTE LANG

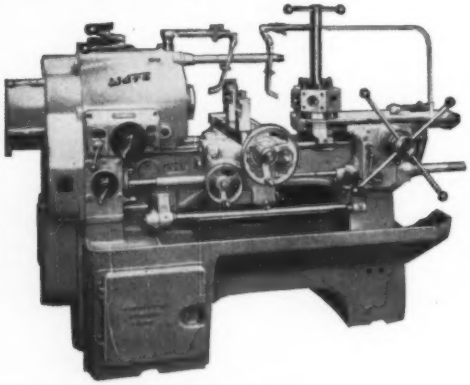


MODEL JC6 CHUCKING LATHE

MODEL 10B2 ENGINE LATHE

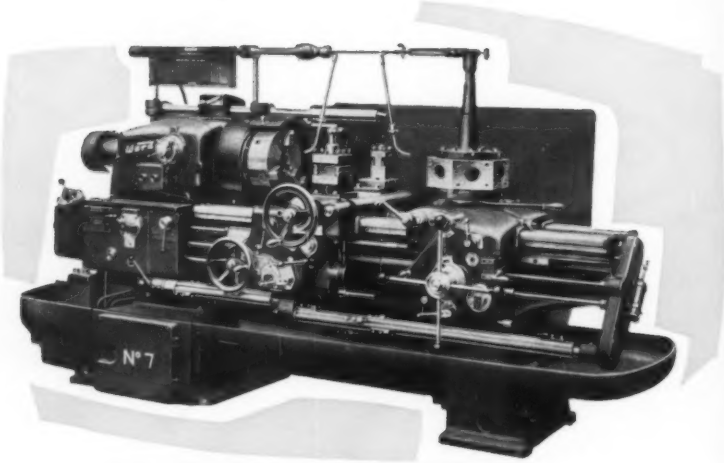


LAPOINTE WARD



MODEL 3DS RAM TYPE TURRET LATHE

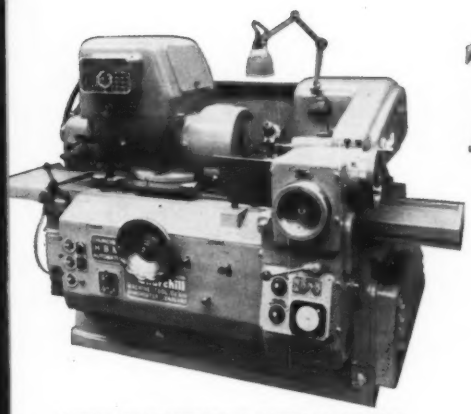
Height of center	7½"
Diameter of hole through spindle	1¾"
Diameter of bar that automatic chuck will take	1½"
Max. diameter that will swing over bed covers	14½"
Number of spindle speeds in each direction	12



MODEL #7 PRELECTOR-SADDLE TYPE TURRET LATHE

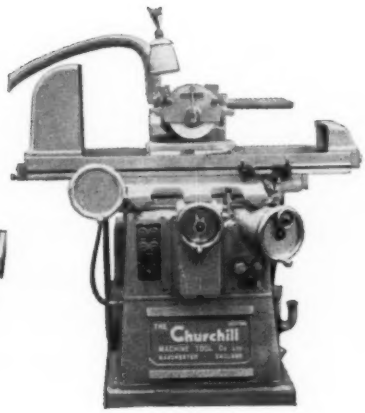
Height of center	8¾"
Swing over stainless steel covers	16"
Diameter of chuck which will swing over cross-slide	9"
Diameter of chuck which will swing up to edge of cross-slide	12"
Diameter of hole through spindle	2⅜"
Number of spindle speeds in each direction	12

LAPOINTE CHURCHILL

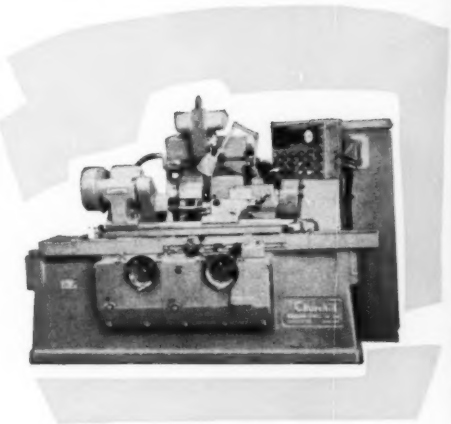


MODEL HBM AUTOMATIC INTERNAL GRINDER

Max. swing inside the guard	12"
Max. swing over table	19"
Max. traverse of work table	18"
Max. bore diameter ground	9½"



MODEL NB 6 x 18 SURFACE GRINDER
Demonstrating the "Rotaform"



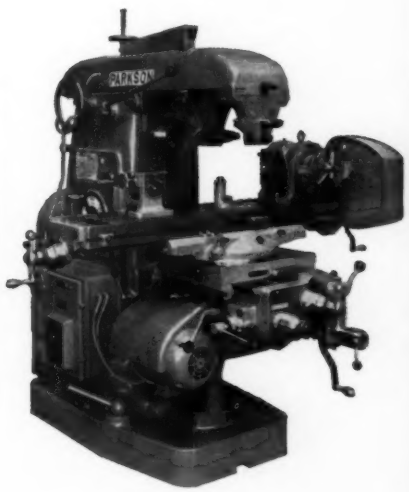
MODEL BW 10 x 36 CYLINDRICAL GRINDER
This machine is shown with diminishing feed mechanism, incorporating automatic wheel truing and compensation, together with automatic control of the machine cycle by electric sizing gage for plunge grinding work.

LAPOINTE PARKINSON

GEARBUR MACHINE

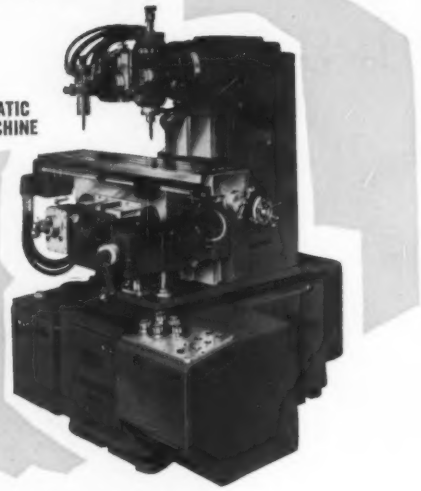
MODEL 5B SUNDERLAND GEAR PLANER
for Spur and Spiral Gears

Will cut spur gears up to	24" dia. 4" face 5 D.P. — ⅝" C.P.
Will cut spiral gears up to a combination of 60°, ⅝" normal pitch, 2¾" face	
Greatest distance, end of spindle to outer support	16½"
Hole through spindle	1½"
Taper hole in spindle	No. 12B. & S.
Diameter of arbor	1¼"



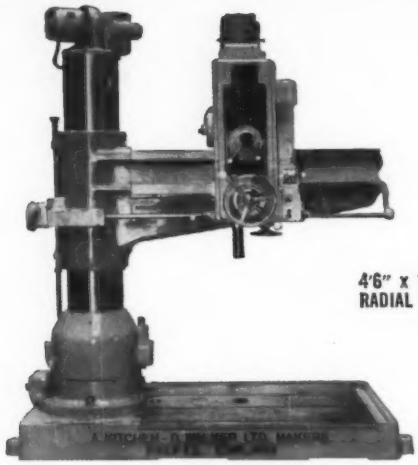
MODEL 2 NU UNIVERSAL
MILLING MACHINE

LAPOINTE HAYES



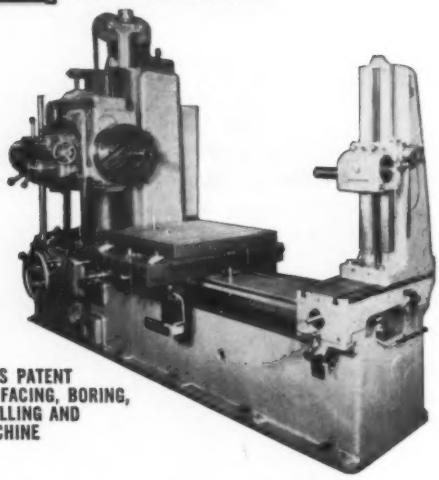
MODEL TM 43A AUTOMATIC
COPY DIE SINKING MACHINE

LAPOINTE KITCHEN-WALKER



4'6" x 14" COLUMN
RADIAL DRILL

LAPOINTE KEARNS



NO. 2 KEARNS PATENT
HORIZONTAL FACING, BORING,
MILLING, DRILLING AND
TAPPING MACHINE

LAPOINTE SPERRY/ORCUTT

ROTARY POSITIONER
WITH NUMERICAL CONTROL
Exceedingly high order of accuracy. Can feed instructions into the circular table as small as one-half second of arc movement (equivalent to about 35 millionths of an inch on the periphery).

All machines are available fully tooled, and backed up by the extensive Lapointe engineering, production and service personnel.

Other models and other capacities of these machines are available. Write for descriptive literature, and prices.

Address Department M

LAPOINTE MACHINE COMPANY

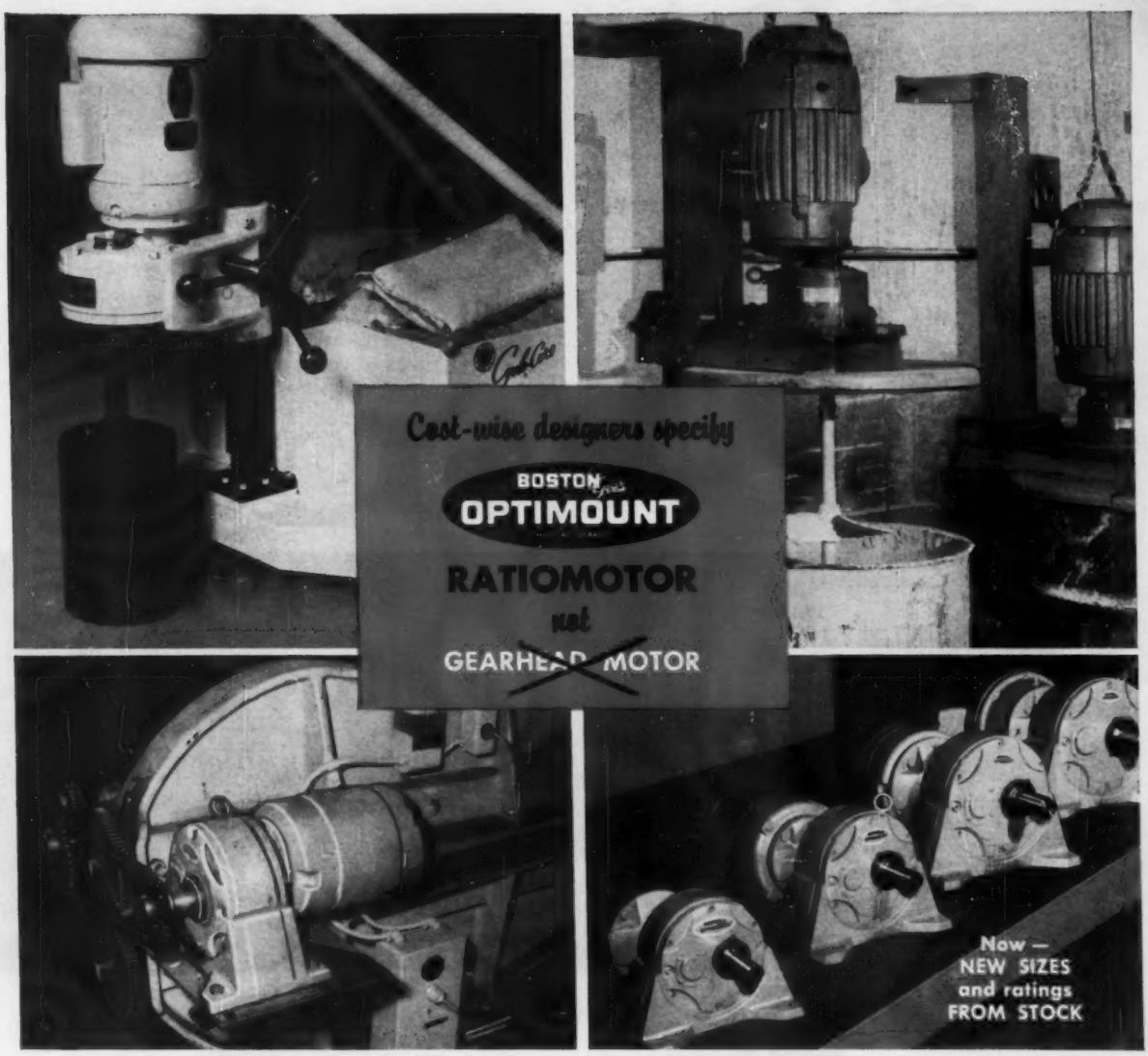
HUDSON, MASSACHUSETTS

Exclusive U. S. Agent for

ASSOCIATED BRITISH MACHINE TOOL MAKERS. LTD.

Also THE GEAR GRINDING CO., LTD. • H. W. KEARNS & CO., LTD.
A. KITCHEN – D. WALKER, LTD.

LAPOINTE
PRECISION
MACHINE
TOOLS



This simple change in specifications starts savings all along the line

BOSTON Gear OPTIMOUNT helical-geared RATIOMOTORS offer a choice of 456 mounting combinations, available FROM STOCK — save you the extra cost and the wait for "specials." You design for highest efficiency, then a phone call to your local Distributor brings you the OPTIMOUNT you specify — ready to install. He can furnish any quantity, and supply them as needed. You avoid big inventory expense, save production time.

You can order OPTIMOUNT Ratiomotors horizontal or vertical base mounted — with a choice of many shaft positions in either base — for any floor, wall, or ceiling mounting position — with single or double reduction helical gearing — for ⅛ to 10 hp drives. You get any arrangement specified, ready to install.

Call your Distributor today for complete information. Boston Gear Works, 65 Hayward Street, Quincy 71, Massachusetts.

Ask Distributor for NEW PRODUCTS SUPPLEMENT to Catalog No. 57

See OPTIMOUNT at BOSTON GEAR BOOTH NO. 1808 DESIGN ENGINEERING SHOW

CALL YOUR NEARBY BOSTON Gear® DISTRIBUTOR

For nearest Distributor look under "GEARS" in the "Yellow Pages"

— STANDARDIZATION PAYS —

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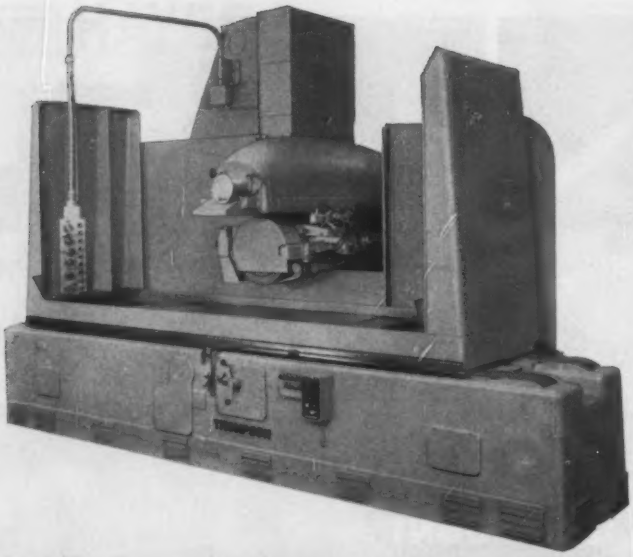


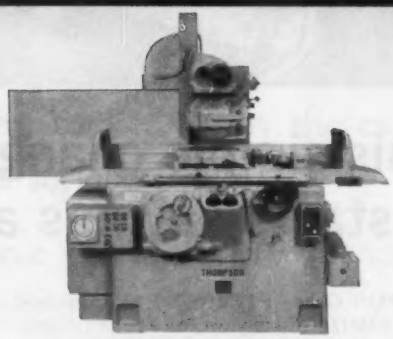
THOMPSON
TYPE CX PLUNGE-MATIC GRINDER
36″ x 48″ x 72″

This grinder features Thompson's new and exclusive "CYBERMATIC PENDANT CONTROL" which completely eliminates the wheel head elevating hand wheel. All vertical movement of the wheel head, both automatic and manual, is accomplished effortlessly by dials on the pendant control.

6 MODERN Thompson *to increase your production*

THOMPSON TYPE SUPER B GRINDER
12″ x 16″ x 36″

The outstanding feature of this Super B Thompson grinder is the 10 HP in-built wheel head motor on a spindle equipped with the world famous MALCUS BLOCK BEARINGS. These bearings are *pre-loaded—self-adjusting—cold running—rotationally stable—vibrationless and free from wear.* Other features are: Dial type cross feed with 14″ of stroke—Tape bed way covers —Thompson Hydra-Cool Hydraulic System with separate hydraulic sealed oil sump—Electro-Autosizing in-process gauging for solid or interrupted work surfaces with automatic spark out to move table to loading position with Autosizing gauge control.



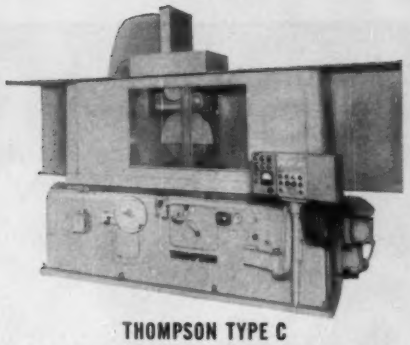
THOMPSON TYPE 2F GRINDER
8″ x 12″ x 24″

Equipped with a 3 HP 1800 RPM wheel head and a 12″x 1″x 4″ grinding wheel, special features on this machine include a table mounted double roll wheel crushing device consisting of 1 work roll and 1 master roll with timed dressing cycle for wheel crushing —9″ wheel head cross feed travel—5 to 90 FPM table speed using Thompson Hydra-Cool Hydraulic System.

THOMPSON TYPE C TAPEFORMING GRINDER
14″ x 28″ x 60″ with 10″ of vertical or horizontal form control

Numerical control consists of Thompson-Ramo-Wooldridge, Inc. Director System utilizing 8-channel punched tape with transistorized module-construction. This system provides numerical control to 3 axes of which 2 axes are selective. Wheel head spindle can be rotated in a horizontal plane for template grinding with a large diameter wheel.

This machine is designed for grinding sophisticated continuous path contours.



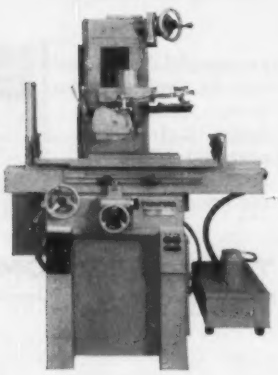
THOMPSON TYPE C
ELECTROLYTIC FORM AND FACE GRINDER
18″ x 28″ x 48″

This machine is equipped with a 3000 ampere ANOCUT electrolytic power unit using formed 16 pitch 90° serrations in an 18″ dia. non-diamond wheel. A stock removal rate as high as .250 cu. in. per minute can be accomplished on the super alloy tool steels with this new electrolytic grinder.

MACHINE TOOLS

efficiency

SEE THEM AT OUR BOOTH NO. 850
MACHINE TOOL EXPOSITION, 1960



THOMPSON TYPE D GRINDER
6″ x 14″ x 18″

This grinder features TRAVATROL power feed to the table without the use of table reverse dogs. Table stroke is controlled by dials set from a scale reading located on front of table. Table speed is infinitely variable from 12 to 35 feet per minute with manual feed also provided. Other features include: A head mounted Hoglund contour dresser manually operated from template with a 10 to 1 ratio covering a contour 1″ wide and ½″ deep.

THE THOMPSON GRINDER COMPANY • SPRINGFIELD, OHIO

"Keep Thompson in mind for that daily grind"

MMT PE

Thompson SURFACE GRINDERS

For more data circle this page number on card at back of book

YODER PIPE & TUBE MILLS

A Yoder engineer can help you realize remarkable savings in the manufacture of ferrous or non-ferrous pipe or tube. He can show you how present Yoder Pipe or Tube Mill owners are increasing production, lowering over-all manufacturing costs and reducing downtime through use of Yoder Mills.

If your products require pipe or tubing from 3/16" to 26" diameters, Yoder Pipe or Tube Mills and accessory equipment can help you produce your product more efficiently to meet today's competitive markets.

In addition to Pipe or Tube Mills, Yoder engineers and builds a complete line of Slitting equipment and Cold Roll-Forming Machinery.

For complete information on Yoder Tube Mills... send for the fully illustrated, 64 page Yoder Tube Mill book... it is yours for the asking.

THE YODER COMPANY
5504 Walworth Ave. • Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING

A Little Puff of Air Is All It Takes

. . . to cut tooling costs 71%, increase production 400% and entirely eliminate your jig costs!

When you inspect the new AMERICAN Positioning Table, you'll find a brand new concept in numerical control!

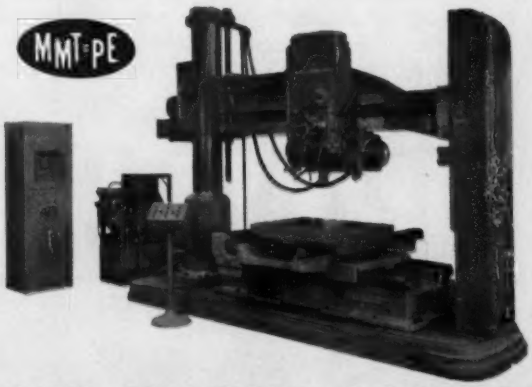
No steel fingers feel and wear the Mylar tape. Entire blocks of information are read at once . . . *by low pressure air* . . . instantly positioning and holding the table without mechanical clamps.

In addition to extremely fast and error proof positioning, the American Positioning Table gives you accuracy of ±.00025" and repeatability of ±.00005" without fail!

Designed by The American Tool Works Company in conjunction with Sperry-Gyroscope electronic engineers, your American ultra-precision Positioning Table is simple to operate and entirely safe from human error.

Ask your American Distributor about "Toolease", our leasing plan under which an American Positioning Table and American Hole Wizard Radial Drill can improve your production . . . while it pays for itself! Or write Section 162 at the address below.

Ask for Bulletins 700 and 801.

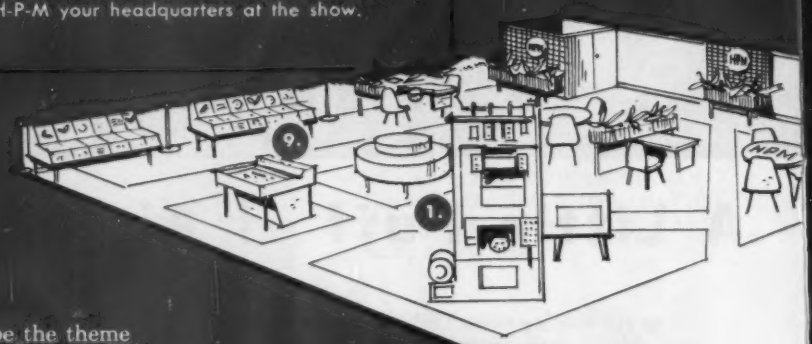


THE AMERICAN TOOL WORKS COMPANY

PEARL STREET AT EGGLESTON AVENUE • CINCINNATI 2, OHIO

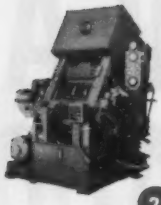
SEE YOU AT THE SHOW

This artist's sketch of the H-P-M display illustrates the depth and scope of our 1960 NMTBA Show exhibit. It's our biggest ever — packed with new machines and exciting modifications of standard equipment you'll want to see. Room for relaxing, too, when the feet give out. Make H-P-M your headquarters at the show.



Production efficiency will be the theme of the H-P-M exhibit at the Show in Chicago, Sept. 6-16. And it's appropriate, indeed. Never before have so many machine improvements or so many new developments been displayed by H-P-M. The items on exhibit include both low and high tonnage press equipment; new hydraulic presses for high production stamping operations; hydraulic power and control components with "on the spot" recording of pressure conditions during operation. It's the biggest and best H-P-M exhibit ever and one you'll want to make sure to see.

BOOTH 1011



A NEW APPROACH TO "SMOOTH EDGE" BLANKING

1. Parts ready for assembly direct from the press . . . made on this special, fully hydraulic triple action press, equipped with special die. Speeds up to 120 strokes per minute. See it run with automatic roll feed! Changes in thickness and type of metal made without press adjustment. Push your way through the crowd and *watch it work — at the show.*

2. **NEW ELECTRONIC CONTROLS FOR HEAVY DUTY PRESSES.** Dynamic new press control developments adapt standard H-P-M metal-working presses for new speed, efficiency and control. A 200-ton blankholder press adaptable for a wide range of jobs will be displayed. *Push-button efficiency — at the show.*

3. **5-TONS OF AUTOMATED VERSATILITY.** The H-P-M C-Press offers basic automation within the budget of all size shops. The press and table combination puts high speed automation in your shop for countless production needs. *See it work — at the show.*

4. **10-TON SERVO CONTROLLED C-PRESS.** With near magic simplicity, the press ram duplicates every motion of the operating lever. Even force on work may be operator controlled; every motion of the lever corresponds exactly to speed and tonnage requirements. *Try it yourself — at the show.*

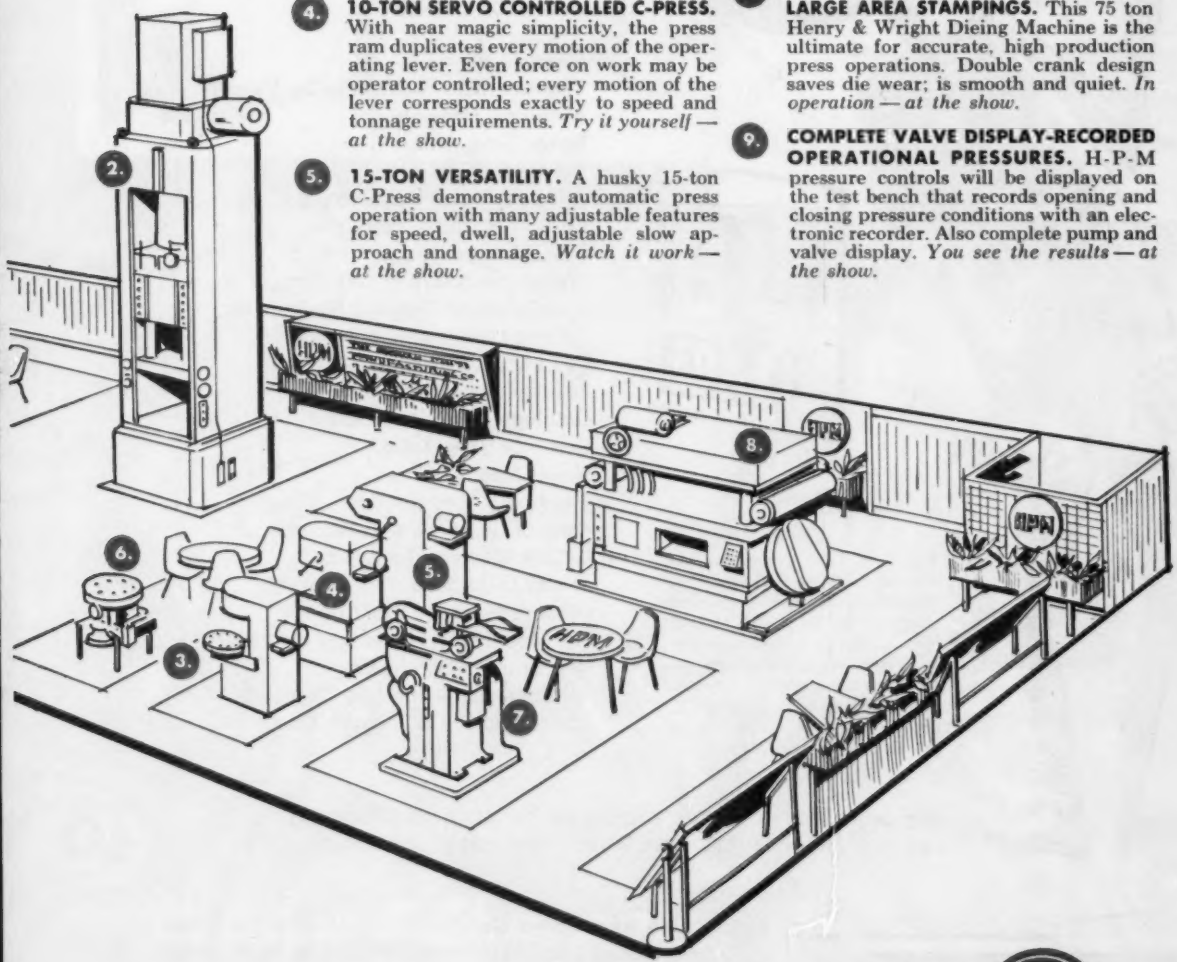
5. **15-TON VERSATILITY.** A husky 15-ton C-Press demonstrates automatic press operation with many adjustable features for speed, dwell, adjustable slow approach and tonnage. *Watch it work — at the show.*

6. **OPERATIONAL INDEX TABLE CUT-AWAY.** See for yourself the features and the functional control of the H-P-M index table. Cutaway viewing permits examination of all moving parts. *For your approval — at the show.*

7. **HIGH PRODUCTION HENRY & WRIGHT, 25-TON.** A perfect demonstration of low to medium tonnage productivity with the versatile, high production Henry & Wright Dieing Machine. Fully equipped; a manufacturing man's dream for top quality production. *See it go — at the show.*

8. **DOUBLE CRANK PRODUCTIVITY FOR LARGE AREA STAMPINGS.** This 75 ton Henry & Wright Dieing Machine is the ultimate for accurate, high production press operations. Double crank design saves die wear; is smooth and quiet. *In operation — at the show.*

9. **COMPLETE VALVE DISPLAY-RECORDED OPERATIONAL PRESSURES.** H-P-M pressure controls will be displayed on the test bench that records opening and closing pressure conditions with an electronic recorder. Also complete pump and valve display. *You see the results — at the show.*



THE HYDRAULIC PRESS MANUFACTURING COMPANY
A Division of Koehring Company • Mount Gilead, Ohio, U.S.A.

H73

U.S. DRILL HEAD MUTUAL ADMIRATION SOCIETY

IS MADE UP OF HEADHUNTERS

(Drill Head Hunters, that is)

...like these:

Chas. G. Allen Co.
The American Tool Works Co.
Avey Drill Division
Baker Bros., Inc.
Barnes Drill Co.
Bilt Rite Tool & Machine Co.
Carlton Machine Tool Co.
Cincinnati Lathe and Tool Co.
Cleereman Machine Tool Corp.
The Cleveland Tapping Machine Co.
Edlund Machinery Co.
Ex-Cell-O Corporation
Fosdick Machine Tool Co.
Giddings & Lewis/Bickford
Greenlee Bros. & Co.
Hause Machines, Inc.
The Heald Machine Co.
Kingsbury Machine Tool Corp.
LaSalle Machine Tool, Inc.
Leland-Gifford Co.
LeMaire Machine Tool Co.
The Motch & Merryweather Machinery Co.
New Britain Machine Co.
Rehnberg-Jacobson Mfg. Company
Sibley Machine & Foundry Corp.
Swift Ohio Corp.

ALL U.S. Drill Heads feature Positive All-Gear Drive . . . Shaved Hardened Gears on Involute Spline Shaft Mounting . . . Super Finish Spindles . . . and other advanced design and construction achievements which have kept U. S. Drill Head Co. Number 1 in the industry since 1915.

WHY DON'T YOU JOIN THIS SOCIETY OF SATISFIED HEADHUNTERS?
ASK OUR ENGINEERS TO TALK WITH YOURS ABOUT U.S. DRILL HEADS!

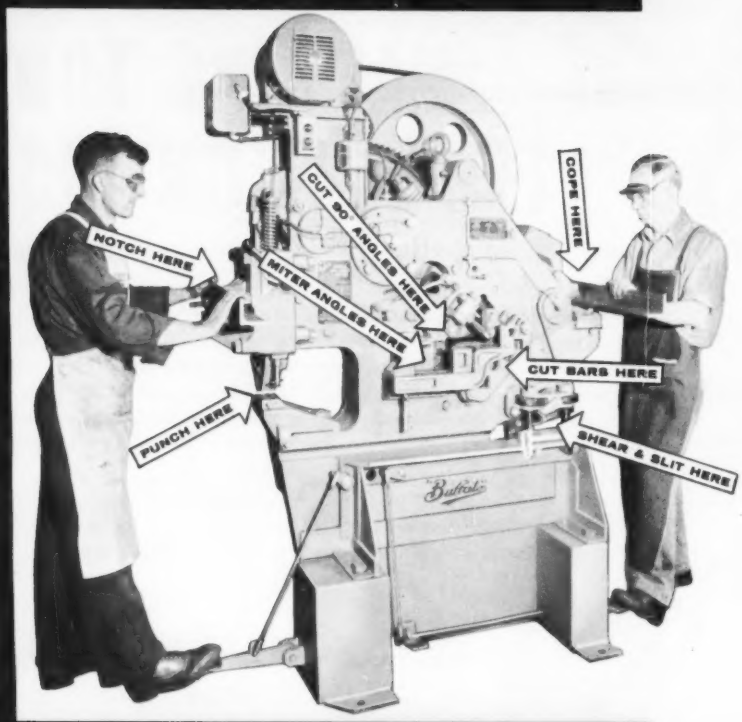
US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.

Cincinnati, Ohio

For more data circle this page number on card at back of book



QUALITY-BUILT 'BUFFALO' MACHINE TOOLS

See Them at the Machine Tool Exposition – 1960

BOOTH 551

SEVEN OPERATIONS – SAME MACHINE

A 'Buffalo' Universal Iron Worker will speed your production and maintenance jobs — cut costs — turn losses into profits.

It can do all the jobs shown — several at the same time — many without changing tools.

This versatile, space-saving machine is quality-built to assure long life with minimum maintenance.

It is available in models and sizes to suit your needs.

Thousands of users call the 'BUFFALO' U. I. W. the most useful machine in their shops. Perhaps you will, too. See it in action at the Machine Tool Exposition. If you're in a hurry for full details, contact your machine tool dealer — or write direct for Bulletin 322.

Buffalo

See what's NEW at Booth 452

to help you make more for less...

Brown & Sharpe

PRECISION CENTER

MMT-PE

MACHINE TOOL EXPOSITION 1960

U.S. DRILL HEAD MUTUAL ADMIRATION SOCIETY

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Hause Machines, Inc.
The Heald Machine Co.
Kingsbury Machine Tool Corp.
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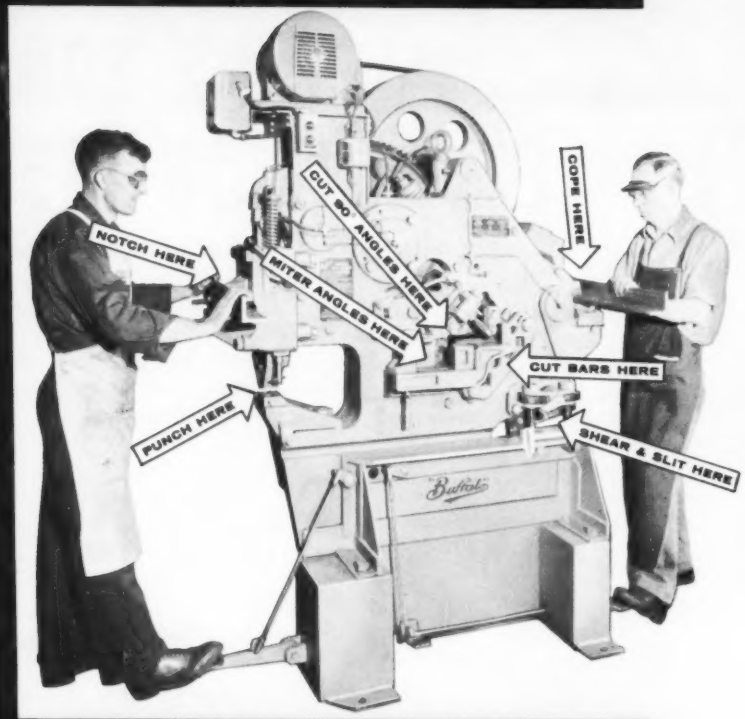
Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.

Cincinnati, Ohio



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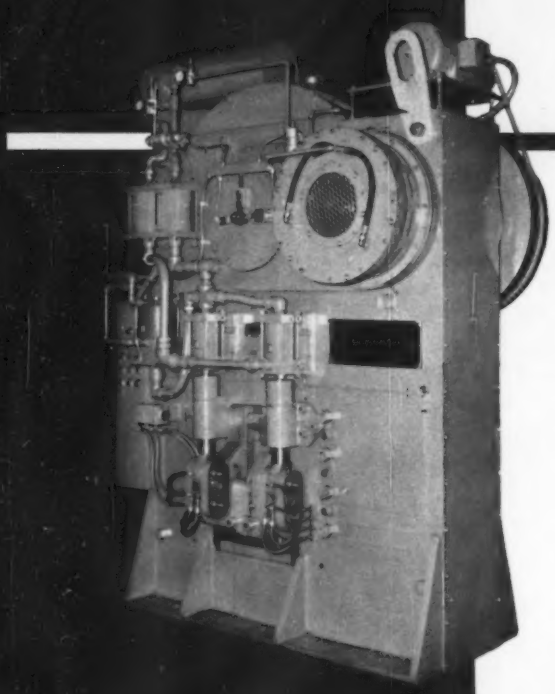
Buffalo



NEW FOR THE MACHINE TOOL EXPOSITION-1960

NEW 'BUFFALO' 400 BILLET SHEAR

For high speed production billet cutting. Continuous operation at full capacity (within its rating) on any shearable material. Handles mild steel squares to 4", rounds to 4½". Speeds up to 60 strokes per minute. Ram tonnage: 400 tons. Machine stroke: 2". Quick, easy knife changing — both knives are removable from rear. Potential of 18,000 cuts per 8 hr. shift on automatic basis. Welded alloy steel frame has guaranteed minimum strength of 65,000 psi. Push button or foot-operated electrical control. Positive pneumatic oiling system.

The new 'Buffalo' 400 Billet Shear in operation will be one of the most exciting exhibits at the Machine Tool Exposition. See it there . . . write direct for complete facts . . . or call your machine tool dealer.

BUFFALO FORGE

Canadian Blower & Forge

DRILLING • PUNCHING

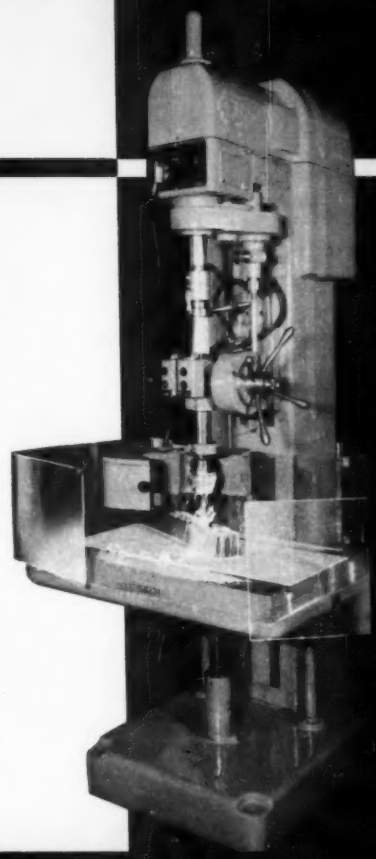
SEE THEM IN OPERATION... BOOTH 551

NEW 'BUFFALO' HOLLOW SPINDLE DRILLING MACHINES

Now you can handle formerly "impossible" drilling jobs at production speeds. Successfully drill super-hard titanium, stellite, rene 41, stainless and other exotic metals — quickly and cleanly with the incomparable 'Buffalo' Hollow Spindle RPMster and #18 drilling machines. Coolant flow through spindle, instant speed changes and extra-rugged construction let you realize full potential of hollow "Cold-Point" drills and diamond core bits.

The results are amazing. Productivity increases range to more than 300% in actual production runs. See the new 'Buffalo' Hollow Spindle machines drilling exotic metals and ceramics at the Machine Tool Exposition. We will test-drill a sample of your hard-to-drill metals. Just bring it to the show.

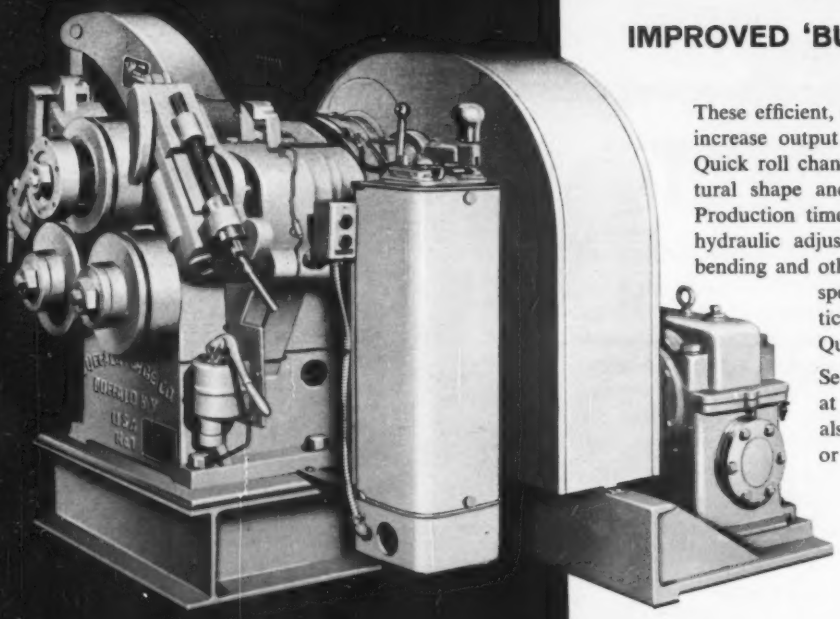
Details available on request.



COMPANY 490 Broadway • Buffalo, N.Y.

Co., Ltd., Kitchener, Ont.

SHEARING • BENDING



IMPROVED 'BUFFALO' BENDING ROLLS

These efficient, sturdily-built machines will cut costs and increase output in your production bending operations. Quick roll changes speed bending of almost every structural shape and size into circles, segments or spirals. Production time can be further reduced up to 30% by hydraulic adjustment on upper roll (optional). Leg-in bending and other specialized jobs are easily handled by special rolls. Choose from horizontal or vertical models in a wide range of capacities. Quality construction assures long life.

See demonstration of 'Buffalo' Bending Rolls at the Machine Tool Exposition. You can also call in your nearby machine tool dealer, or write us direct for Bulletin 352.

See 'BUFFALO' machine tools in action at the Machine Tool Exposition, 1960...BOOTH 551

ESTABLISHED 1877
"Buffalo"
MEMBER N.M.T.B.A.

See what's NEW at Booth 452

to help you make more for less...

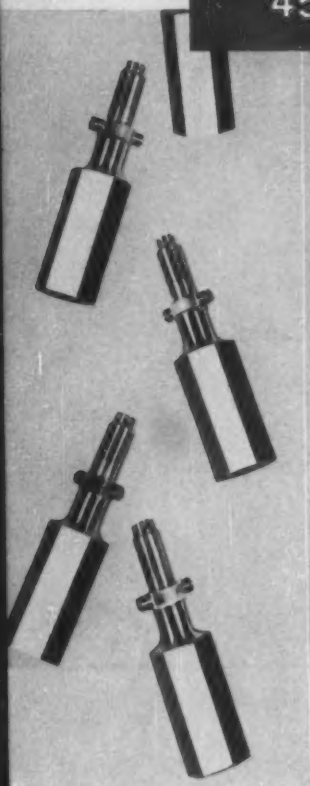
Brown & Sharpe
PRECISION CENTER

MMT-PE
MACHINE TOOL EXPOSITION 1960

MMT·PE

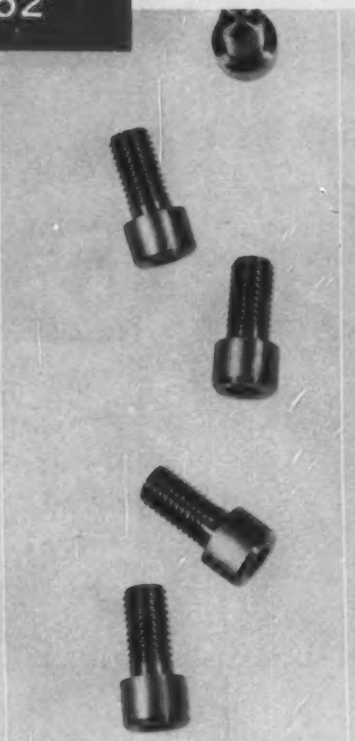
See what's new at Booth 452

TO HELP YOU MAKE MORE
FOR LESS WITH SCREW MACHINES



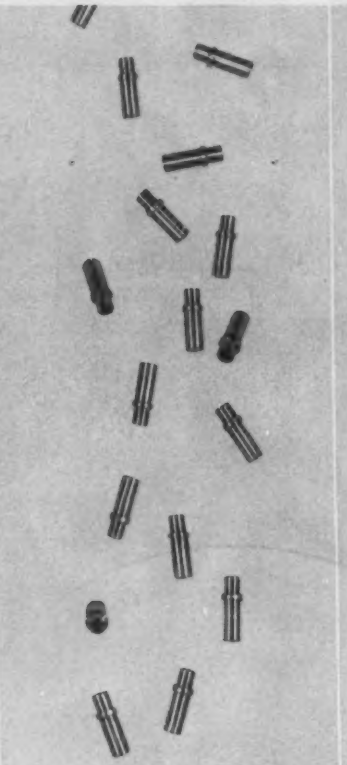
NEW fourth slide permits added operations in cycle

Upper front forming slide has 2 tool holders for turning right or left hand. At upper back is cut-off slide. Both slides are interchangeable.



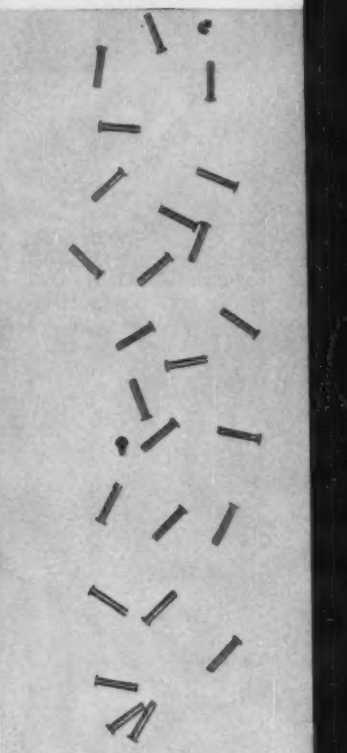
NEW drilling & broaching attachment extends work range

Picks up cut-off piece, drills back end and punch broaches with 18,000 lb. pressure (generated from 80 lb. air). Or, broaches front end.



NEW electronic gaging holds closer tolerances

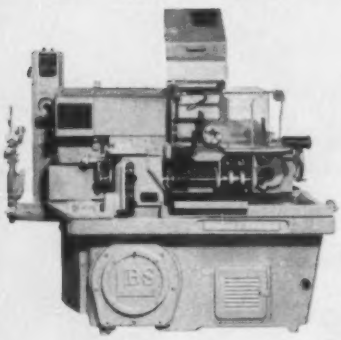
Comparator checks each part from transfer mechanism — shuts off feed at first bad part. Operator resets tools fast by observing "over-under" lights.



NEW faster feeding boosts small diameter parts production

10,000 rpm provided in bar feed mechanism by auxiliary that stops spindle liner momentarily when stock is fed. Eliminates centrifugal problems.

Brown & Sharpe Automatics show dramatic progress in output speed, accuracy, and adaptability



New-design advantages like these in Brown & Sharpe's new Automatic Screw Machines can boost your production rates as much as 100%. Brown & Sharpe is constantly at work improving Nos. 00, 2 and 4 Automatics — to save you money — to give you even better precision and finish — to increase machine adaptability for different types of work.

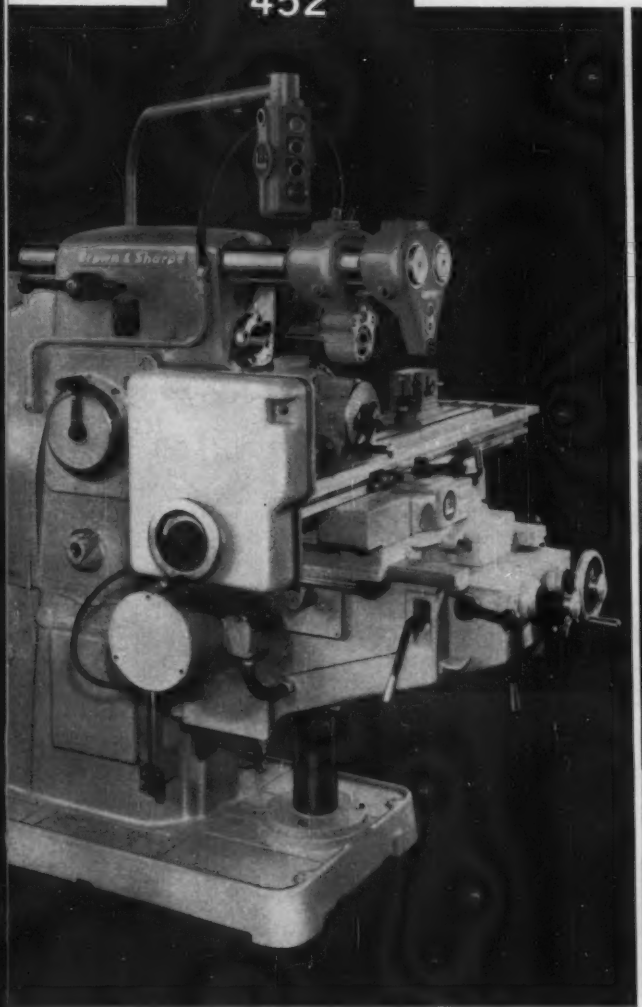
These four examples of continuing B&S design leadership will be dramatically demonstrated at Booth 452. Stop in and see for yourself why plants that replace old equipment with new B&S automatics can write off the investments in record time, with daily dollar savings. Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

Brown & Sharpe PRECISION CENTER

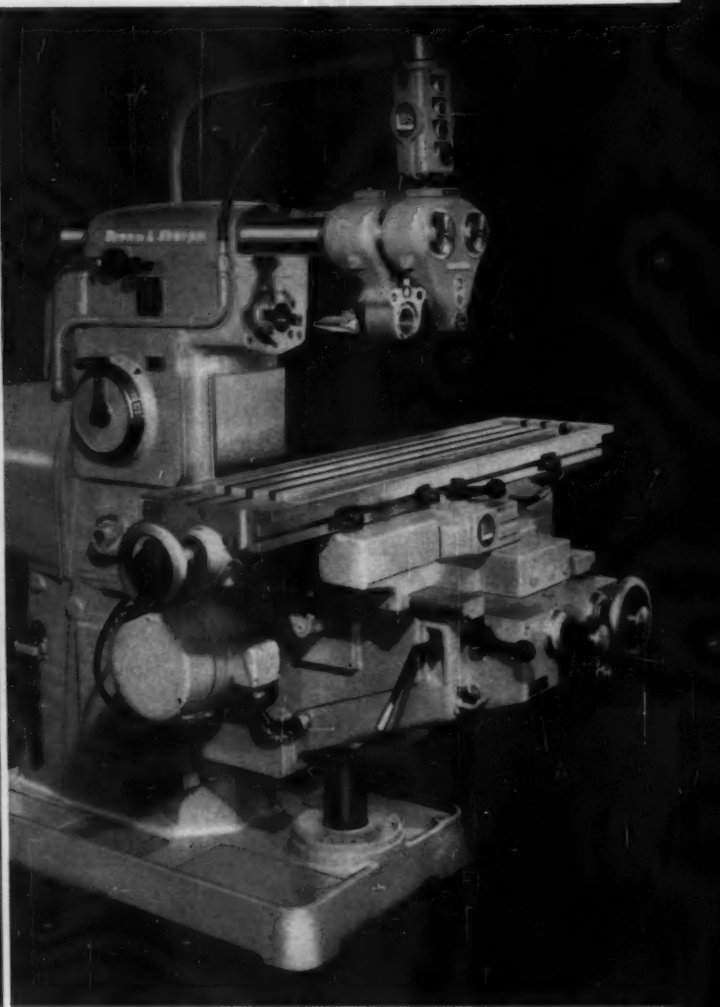
MMT·PE

See what's new at Booth 452

TO HELP YOU MILL MORE FOR LESS



NEW B&S No. 2 Universal Milling Machine



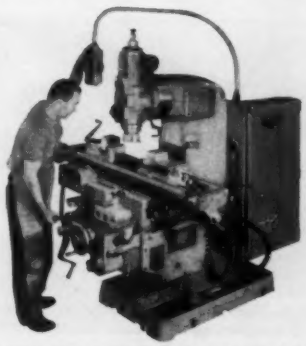
NEW B&S No. 2 Plain Milling Machine

Introducing 14 new B & S DYNAMASTERS - No. 2 Plain, Universal, Vertical; and Rangemasters - 3, 5, 7.5, 5/10 hp

You'll see something new from every viewpoint in the B&S No. 2 Milling Machines on display in Booth 452. And, whatever your specific needs, you'll see why the new series provides every feature you want for top efficiency and economy in your milling operations. Construction with standard units offers a choice of 132 cost-cutting combinations, permits you to select a machine "custom built" to your needs, ready for prompt delivery. The B&S Rangemaster® sliding head type machine, also exhibited, incorporates many of the same advantages.

You'll also see the B&S NUMERICAM Tape-Controlled Cam Milling Machine, which saves up to 90% in cam production costs — and the new Deep Hole Drilling Machine that eliminates the need for expensive fixtures.

See them all at Booth 452 . . . or write for full information. Machine Tool Division, Brown & Sharpe Manufacturing Company, Providence 1, Rhode Island.



NEW B&S No. 2 Vertical Milling Machine

Brown & Sharpe PRECISION CENTER

MMT·PE

See what's new at Booth 452

TO HELP YOU GRIND MORE FOR LESS

New Brown & Sharpe 1030 MICROMASTER Surface Grinding Machine

New B&S 824, 1024 and 1030 MICROMASTERS give outstanding surface grinding performance

Elimination of saddle (no table twist) assures accurate grinding of parallel, vertical surfaces.

Ever since the introduction of the 618 MICROMASTER, demand has steadily increased for larger capacity B&S Surface Grinders with the same profit-saving, super-precision performance. Now they are ready — in 8″ x 24″, 10″ x 24″, and 10″ x 30″ sizes, all with full hydraulic control. You can see them in action at Booth 452.

As with the 618 MICROMASTER, you can order these new machines with a wide range of optional and additional equipment or factory-modification to provide the exact equipment required for your specific grinding needs.

Also at the Brown & Sharpe Booth, you'll see machines that make production grinding to millionths a commonplace achievement of average operators.

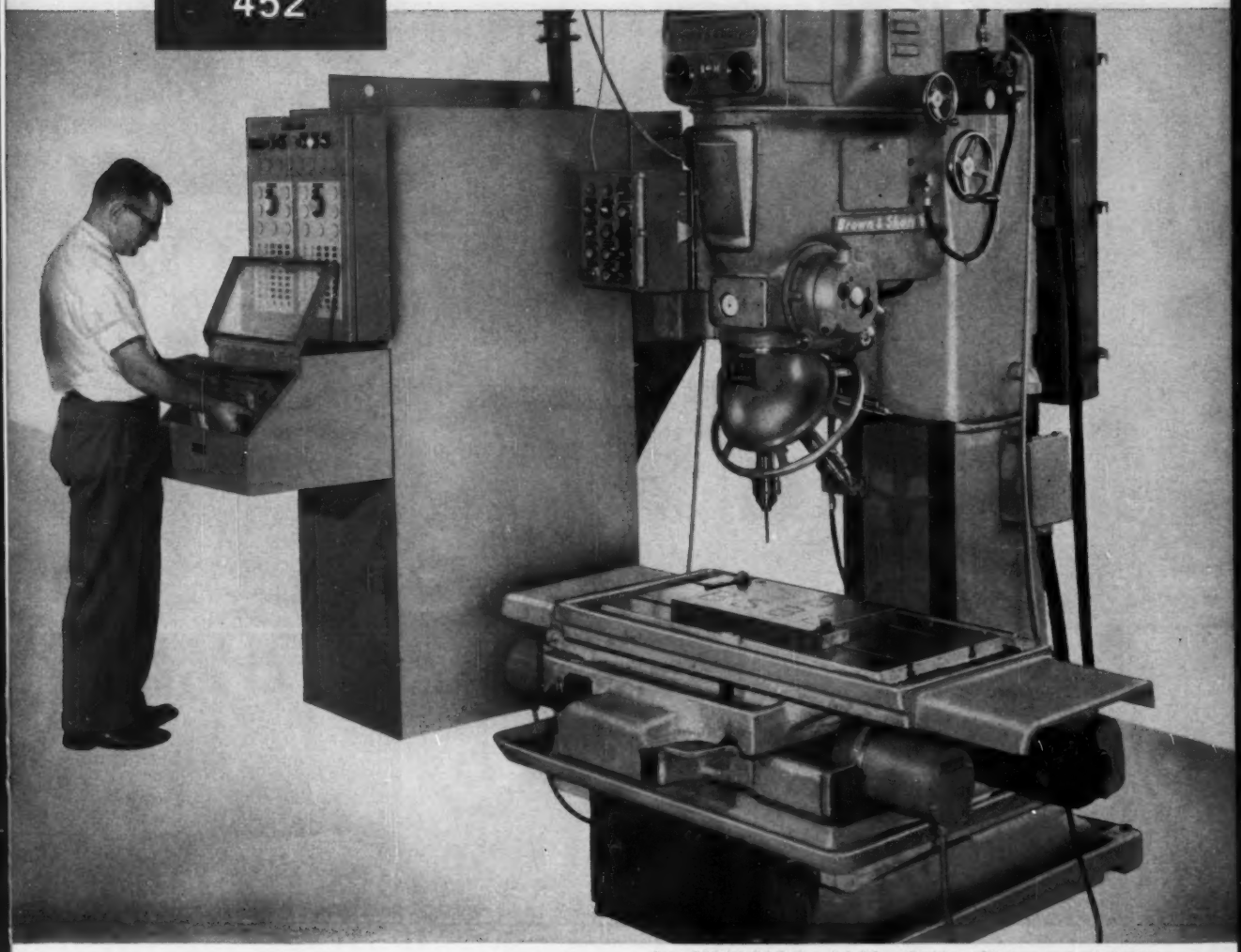
Stop in and get full information, or write: Machine Tool Division, Brown & Sharpe Manufacturing Company, Providence 1, Rhode Island.

Brown & Sharpe PRECISION CENTER

MMT·PE

See what's new at Booth 452

TO HELP YOU DRILL AND TAP MORE FOR LESS



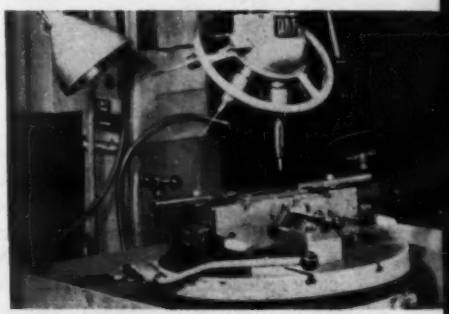
New B&S Model B Turret Drilling Machine with tape-controlled table.

New B&S tape-controlled Turret Drilling permits up to 75 to 1 reduction in tooling costs

Brown & Sharpe Turret Drilling Machines and Work-Positioning Tables regularly score production gains as high as 5 to 1 over conventional gang-drill box-jig methods, with manual or automatic operation. Now, tape-control adds tooling cost savings as high as 75 to 1.

This revolutionary advance in automation of drilling, tapping, reaming, and boring is on view in Booth 452. Completely automatic, fully integrated locating and machining operations are performed by the B&S Model B Turret Drilling Machine and the B&S Work Positioning Table, guided by a tape control.

Plan now to see this dramatic demonstration if you attend the Exposition . . . or write for details: Machine Tool Division, Brown & Sharpe Manufacturing Company, Providence 1, Rhode Island.



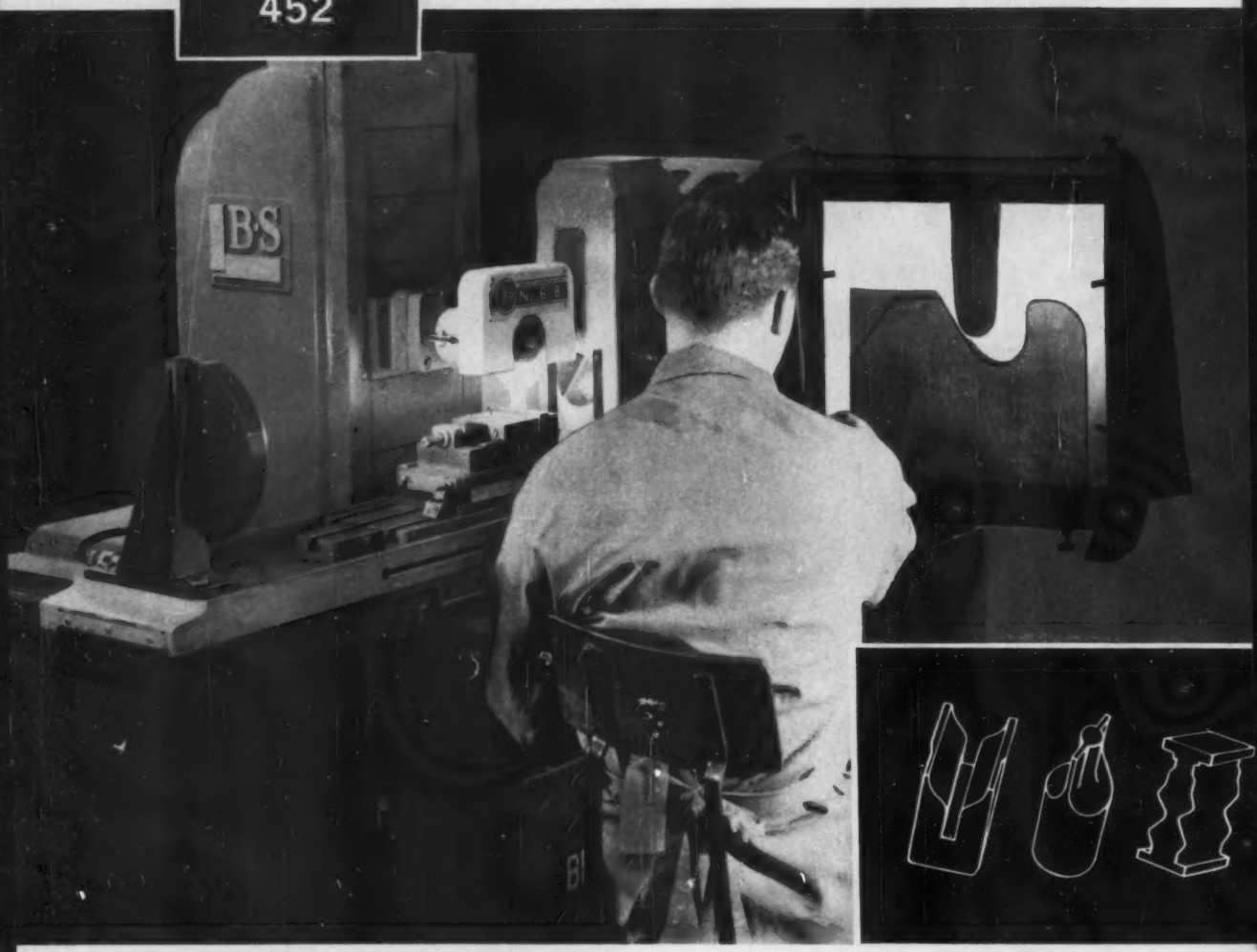
Manually operated Model A B&S Turret Drilling Machines and Positioning Tables provide jig-less drilling at low cost.

Brown & Sharpe PRECISION CENTER

MMT-PE

See what's new at Booth 452

TO HELP YOU GRIND MORE FOR LESS



Up to 300% faster form grinding in carbide, ceramics – Brown & Sharpe MICROMASTER with VISUAL GRIND

VISUAL GRIND, the built-in comparator on the B&S 618 Surface Grinding Machine, permits tool and die makers to meet today's demand for intricate shapes in super-hard materials with spectacular savings in work hours and wheel costs.

Skilled operators can save up to 300% in set-up and grinding time. There is no need to remove work for frequent inspection with separate equipment. Semi-skilled workers, also, quickly learn to "follow the line," and match the clearly visible, true image of the work to the form layout drawn on the screen. Wheel costs are drastically reduced in grinding carbide and ceramics — any contours can be reproduced with a few simple wheels.

An unlimited variety of forms can be produced in punches, dies, and similar work — with through, blind, or template grinding — using standard equipment and simple attachments.

The MICROMASTER® with Visual Grind provides all the extra profit-saving advantages of the new B&S 618 Surface Grinder. It can be readily used for other grinding, of surfaces up to 6″ x 14″, without disturbing the optical system.

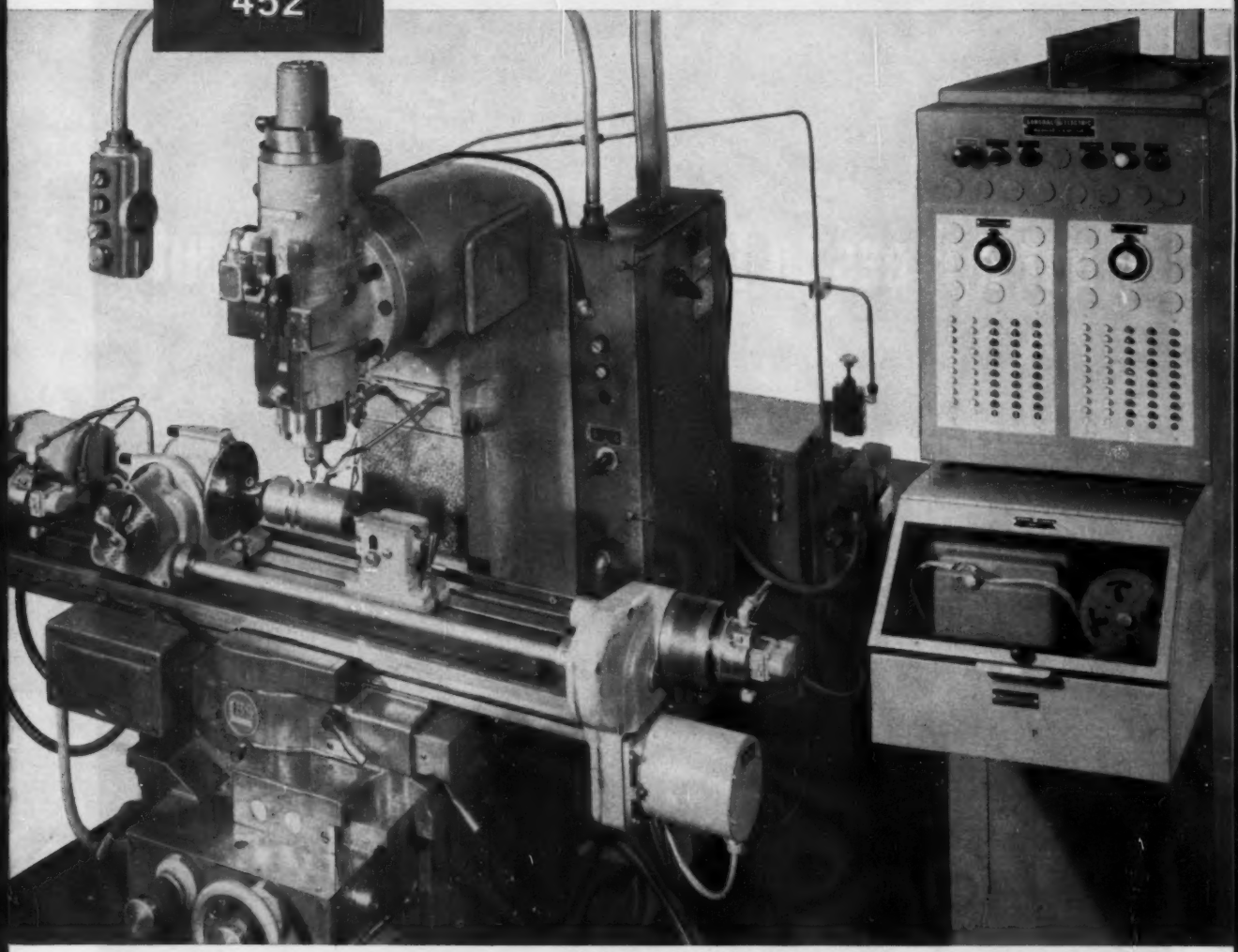
THE VISUAL GRIND® system is manufactured by The Cleveland Grinding Machine Co. and is sold only by Brown & Sharpe. For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

Brown & Sharpe PRECISION CENTER

MMT·PE

See what's new at Booth 452

TO HELP YOU MILL MORE FOR LESS



NUMERICAM Cam Milling Machine with Mark II Numerical Positioning Control

New Brown & Sharpe tape-controlled NUMERICAM saves up to 90% of cam layout and machining costs

The NUMERICAM is a revolutionary new system for cam cost reduction. The new B&S milling machine is arranged for tape control with electrically controlled servo-drive to index centers and table, and hydraulic power down feed to the cutter spindle. A G-E Mark II Positioning Control guides the fully automatic cycle. Other tape-control equipment may also be used.

The point-to-point cam-path machining system used is highly accurate. It is relatively simple, and the investment required for computing and control equipment is much lower than for the full contouring method.

Find out how the NUMERICAM can turn out your cams in one-tenth the time required for manual methods, and pay for itself in record time. See it at Booth 452, or write: Machine Tool Division, Brown & Sharpe Manufacturing Company, Providence 1, Rhode Island.

NUMERICAM mills any cam path or hole pattern in cylindrical, conical or flat surfaces; on plate cams or templates.

Brown & Sharpe PRECISION CENTER

Want a Press to Triple Your Forging Output?

We'll build the press for all your forging requirements . . .

Tell us your forging problems and give us your production specifications—we'll do the rest.

Erie Foundry, one of the first companies to automate forging, can provide specially designed *high volume* presses in capacities of 1000 to 8000 tons. Instead of the three machines and nine men formerly required, now you need only one Erie automated forging press and only one operator observer—to triple your present production rate! Trimming, too, can be accomplished in a single production cycle. With billet supply and finished part removal conveyorized, it is possible to achieve a production volume of, say, 1200 track-link forgings per hour.

Erie Foundry has a complete line of machines designed for high volume production of such parts as connecting rods, gear blanks, automotive and tractor valves, pinions, track links and wheel hubs.

We would like to discuss application of automated presses to your production requirements. For the complete story, phone or write Mr. R. E. Sanford, Erie Foundry Company, Erie 5, Pa.

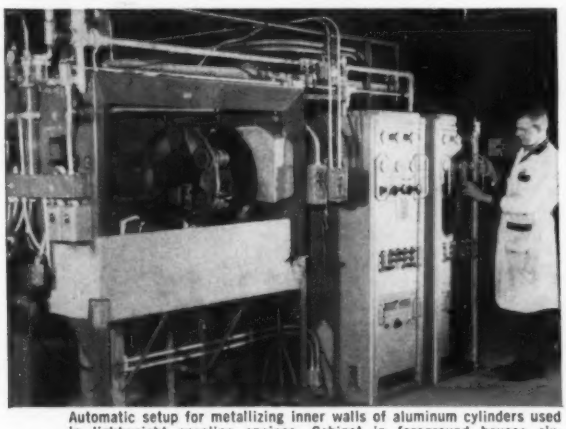
ERIE

ERIE FOUNDRY CO.

The world's great name in forging since 1895 EF-59-01

Flame sprayed metal increases wear resistance better than 10 times

AIDS WEIGHT REDUCTION



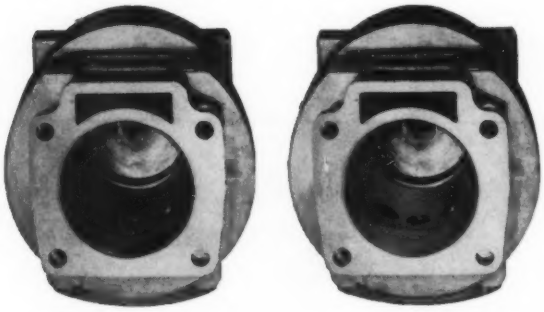
Automatic setup for metallizing inner walls of aluminum cylinders used in lightweight gasoline engines. Cabinet in foreground houses six-station rotary setup; automatic control panels are at right.

Many methods, including cast-iron cylinder liners and chrome plating, have been tested for wear resistance in lightweight gasoline engine blocks of aluminum.

Best of these methods experienced breakdowns in less than 400 hours. Now they are metallized with METCO Sprabond (molybdenum alloy) as a bonding agent, followed by a coating of sprayed steel alloy.

Test runs of over 4,000 hours show little or no wear of the metallized surface. Finish thickness is .007"; weight – a few grams. Cast-iron liners weighed almost ½ pound.

Cylinder at left machined ready for flame spraying; one at right has been metallized and hone finished.



Closeup of automatic six-station rotary setup. Cylinders are individually rotated at 150 rpm. Cylinder is loaded on table at Station 1, moved through Stations 2 and 3 for pre-heating by torch. At Station 4, bonding coat is applied by the gun nozzle which feeds into the rotating cylinder. Low alloy steel is applied at Station 5 and cylinder cools at Station 6. Cylinder walls are finished by honing.

New engineering data bulletin

Bulletin 136B—The METCO Flame Spraying Processes, provides basic engineering and application data on flame sprayed coatings of metals, ceramics, carbides and other high melting point materials. 16 pages. Send coupon for free copy.

METCO INC.
FORMERLY METALLIZING ENGINEERING CO., INC.
Flame Spray Equipment and Supplies
1131 Prospect Ave., Westbury, Long Island, N.Y.
Telephone: Edgewood 4-1300 Cable: METCO
In Great Britain: METALLIZING EQUIPMENT CO., Ltd.
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Don Watson
Please send Bulletin 136B.

name title

company

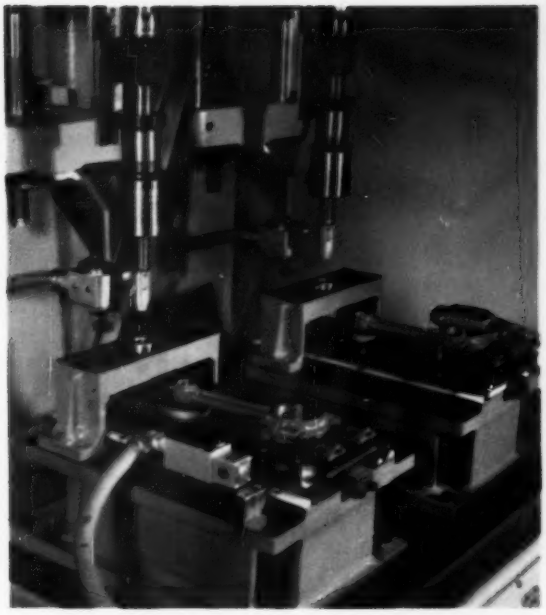
address

city zone state

For more data circle this page number on card at back of book

NATCO
NATCO

Short-bore production honing finally gets its own machine tools—sturdy Natco/Jes-Cal mechanical honing machines built to maintain honing tolerances under continuous production conditions.



NEW

Natco Heavy Duty Production Honing Machines

Pinion gears, connecting rods, rocker arms, compressor components—Natco/Jes-Cal mechanical honing machines have been developed for better honing of just such parts as these.

These new machines are designed to use production-proven Jes-Cal honing tools with the exclusive, automatic, plug-gage method of size control. Add the sturdiness and tolerance-holding stability of Natco machine design and you know why these are machines to end your production honing problems.

They will hone any bore from ½″ to 3″ in length and up to 3″ in diameter. Rotational speeds of 200 to 800 rpm and reciprocation from 60 to 240 strokes per minute are fixed by pick-off gears. Stroke length up to 3″ is adjustable in desired increments.

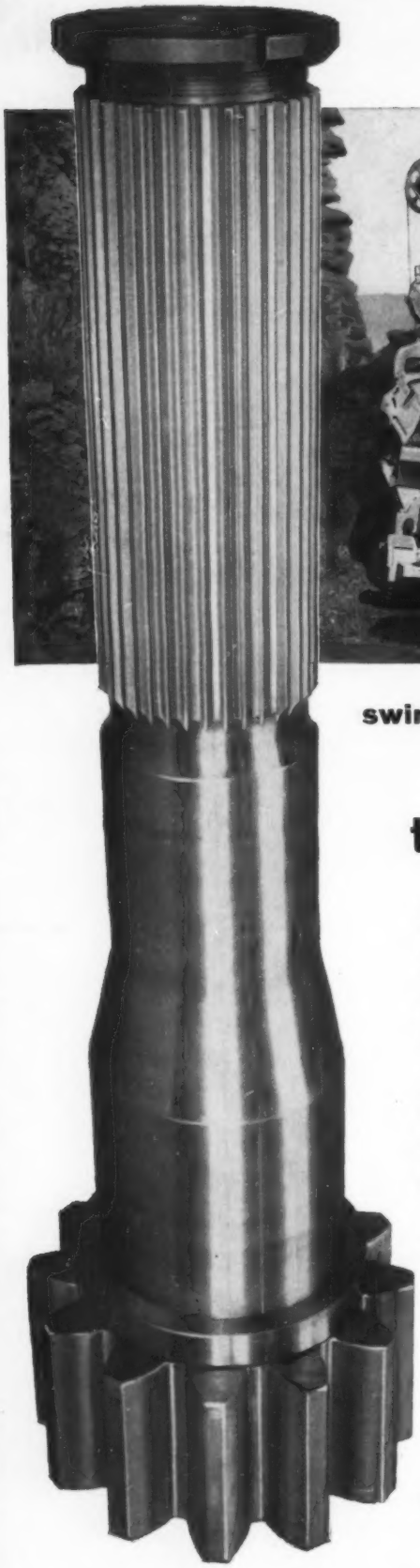
Use them singly or as multiple heads on a common base. Integrate them into your transfer line—they are fully compatible with Natco drilling, tapping, boring, and milling machines. For more facts call your Natco or Jes-Cal representative. Write for Bulletin 200.

The National Automatic Tool Company, Inc., Richmond, Indiana

NATCO

Natco/Jes-Cal mechanical honing machines can be set up singly or in batteries on a common base. They are easily integrated into a Natco fully automatic transfer line.

Is your honing problem—or something like it—in this collection? These are typical jobs honed at high production rates on the new all-mechanical Natco/Jes-Cal honing machine.



swing! stop! swing!

4340 nickel alloy steel takes shock-loading in stride

Every time the big Lima Type 2400 turns to dig or dump, this 9"-diameter, 36"-long swing shaft of 4340 nickel alloy steel transmits tremendous torque to a giant ring gear, to swing the rotating assembly smoothly and speedily.

Through-hardening 4340 nickel alloy steel gives this swing shaft the strength, the toughness, the uniform hardness, to stand up to hundreds of swing-stop-swing cycles every working day.

And because 4340 is readily machined at high hardness, both spur pinion and spline are machined on the shaft *after* heat treatment. The resulting one-piece component provides an extra measure of dependability; it permits splined mounting of gears on shafts with close, accurate fit, plus even distribution of shaft stresses.

For your medium-to-heavy section parts, you'll find 4340 nickel alloy steel delivers the high mechanical properties that make for trouble-free performance in the toughest service. Available right off the shelf at Steel Service Centers, this versatile through-hardening steel is ready for immediate delivery in a wide selection of sizes. Other nickel alloy steels, possessing special properties for specialized applications, are also widely available.

Next time you're faced with heavy wear and loading problems—such as in earth-moving equipment or motor-vehicle applications—remember Nickel alloy steels. *They can take it.*

THE INTERNATIONAL NICKEL COMPANY, INC.

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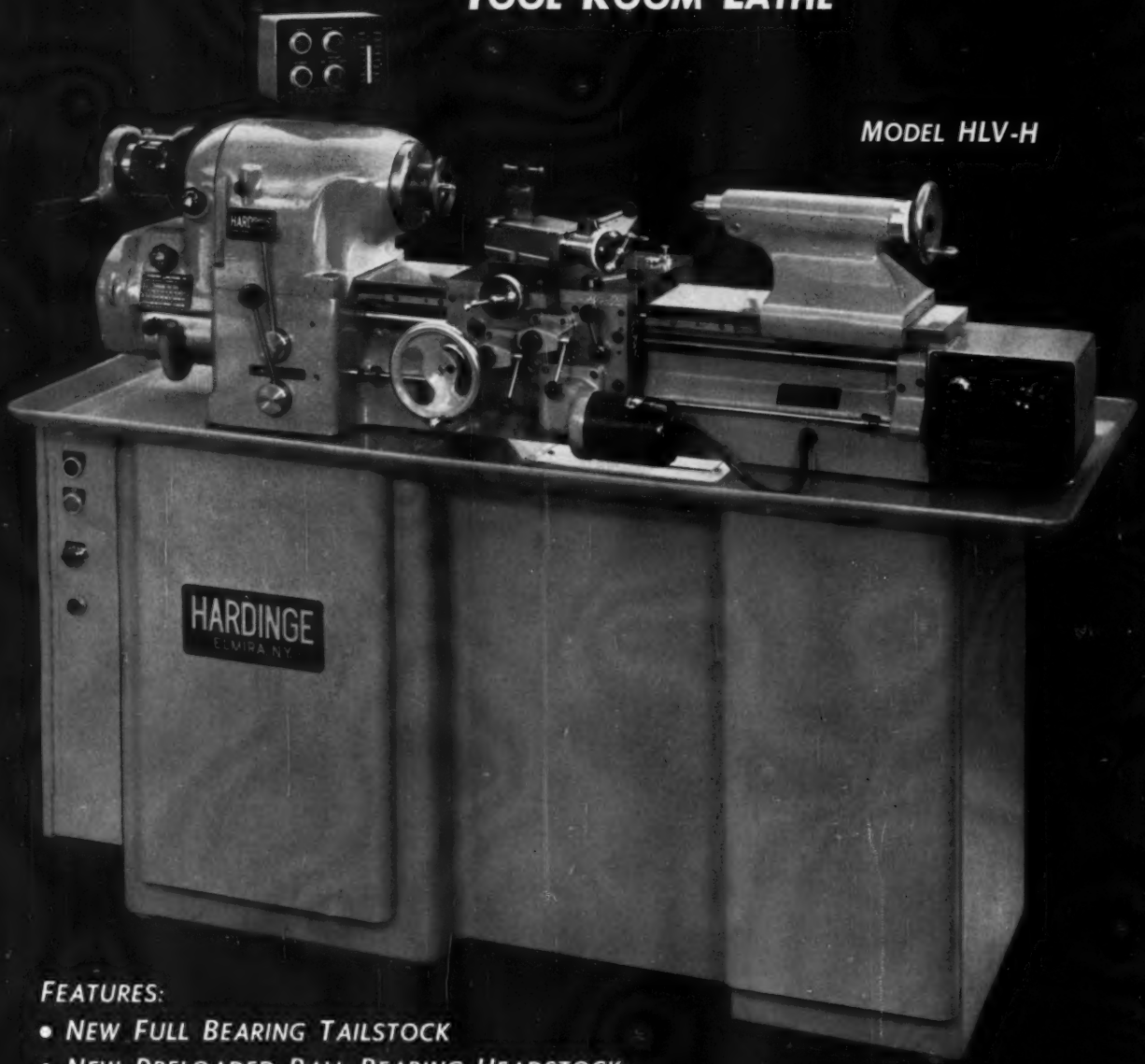
NICKEL MAKES STEEL PERFORM BETTER LONGER

HARDINGE
ELMIRA, N.Y.

THE NEW

HARDINGE HIGH SPEED TOOL ROOM LATHE

MODEL HLV-H



FEATURES:

- NEW FULL BEARING TAILSTOCK
- NEW PRELOADED BALL BEARING HEADSTOCK
- NEW ELECTRIC INTERLOCK FOR SPINDLE LOCK PIN
- NEW WIDER FULL BEARING HARDENED AND GROUND DOVETAIL BEDWAYS

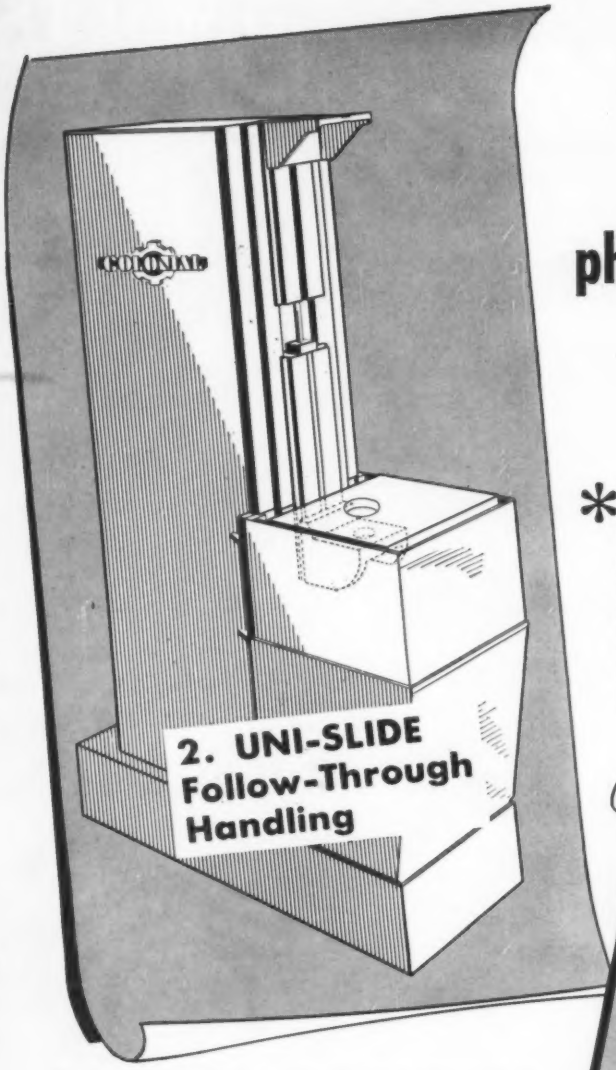
WRITE FOR FREE BULLETIN

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

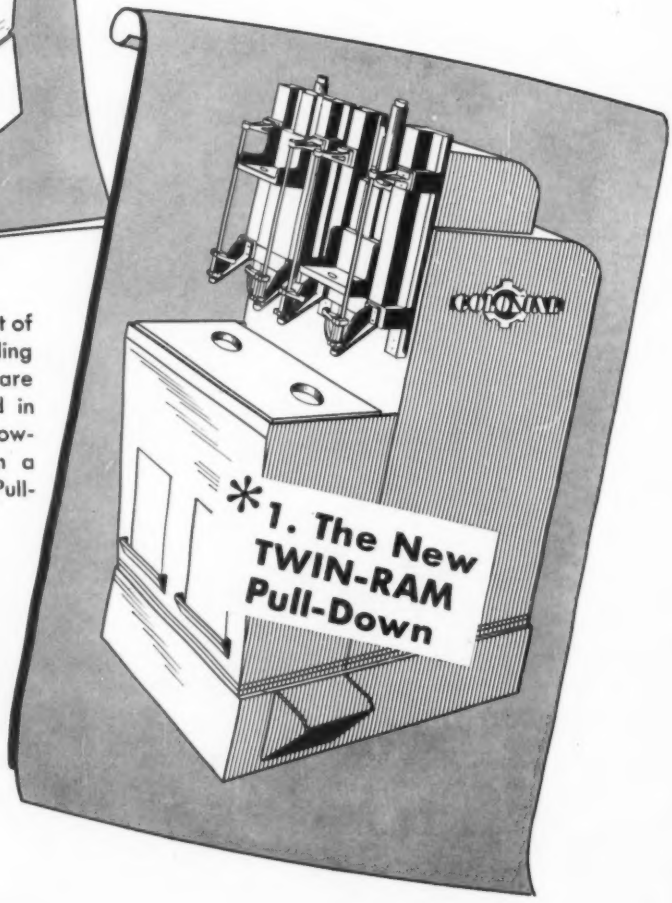
"PERFORMANCE HAS ESTABLISHED LEADERSHIP" FOR HARDINGE

SO NEW...

we couldn't even photograph the production machines in time for this issue



* **1.** Another Colonial "First"—the new TWIN-RAM PULL-DOWN eliminates lost time for return stroke and banking of parts between operations. Uses simple shuttle tables for unloading during return stroke of each ram. Also permits 2-pass operation on the same part (such as roughing and finishing); or two separate operations on each ram; or internal broaching on one and surface broaching on the other.



2. The UNI-SLIDE—insures perfect alignment of the mounting faces of the pull and handling brackets. They operate on the same gibs, are in the same plane and are even machined in one setup. The design provides FULL follow-through for broach handling. Available on a complete line of tonnages of Model DS Pull-Down broaching machines.

COLONIAL
BROACH & MACHINE CO.
DETROIT 13, MICH.

***** *In operation at Booth 241, Machine Tool Exposition in Chicago: 6-ton 42-inch stroke model RDT broaching spiral splines on two different parts.*

THE **NEW**

HARDINGE
ELMIRA, N.Y.

HARDINGE HIGH SPEED PRECISION LATHE

MODEL DV59

FEATURES:

- NEW FULL BEARING TAILSTOCK
- NEW PRELOADED BALL BEARING HEADSTOCK
- NEW ELECTRIC INTERLOCK FOR SPINDLE LOCK PIN
- NEW COMPOUND SLIDE REST WITH HARDENED AND GROUND STEEL TOOL POST SLIDE

WRITE FOR FREE BULLETIN

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

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TOOL HOLDERS

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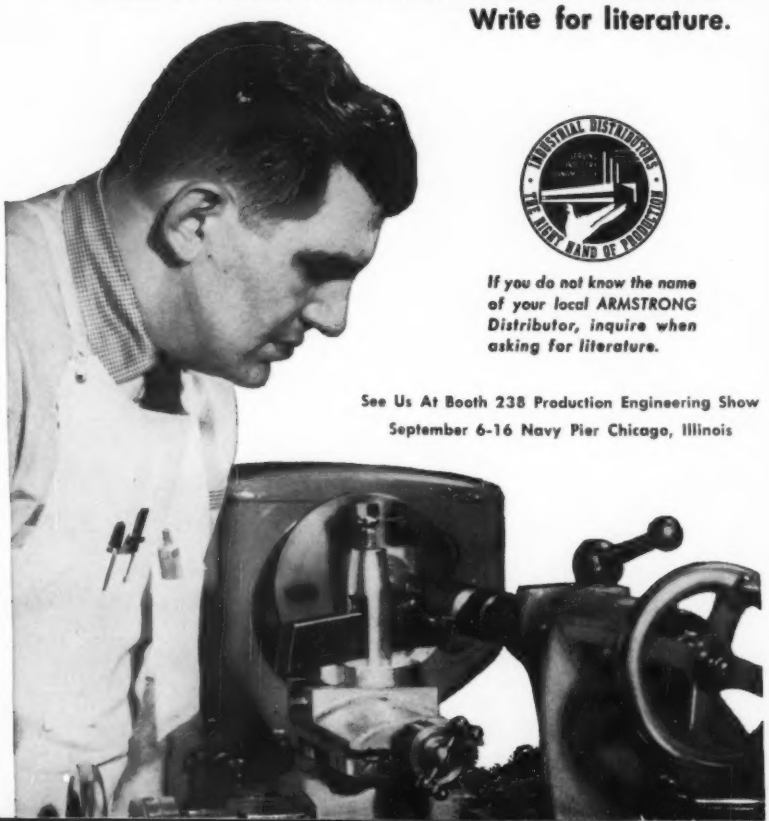
ARMSTRONG Tool Holders are long-lasting tools. They are strong beyond need, handy and efficient, profitable to use, and are readily available from your local ARMSTRONG Distributor.

Check over your ARMSTRONG Tool Holder needs.
Write for literature.



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ELMIRA, N.Y.

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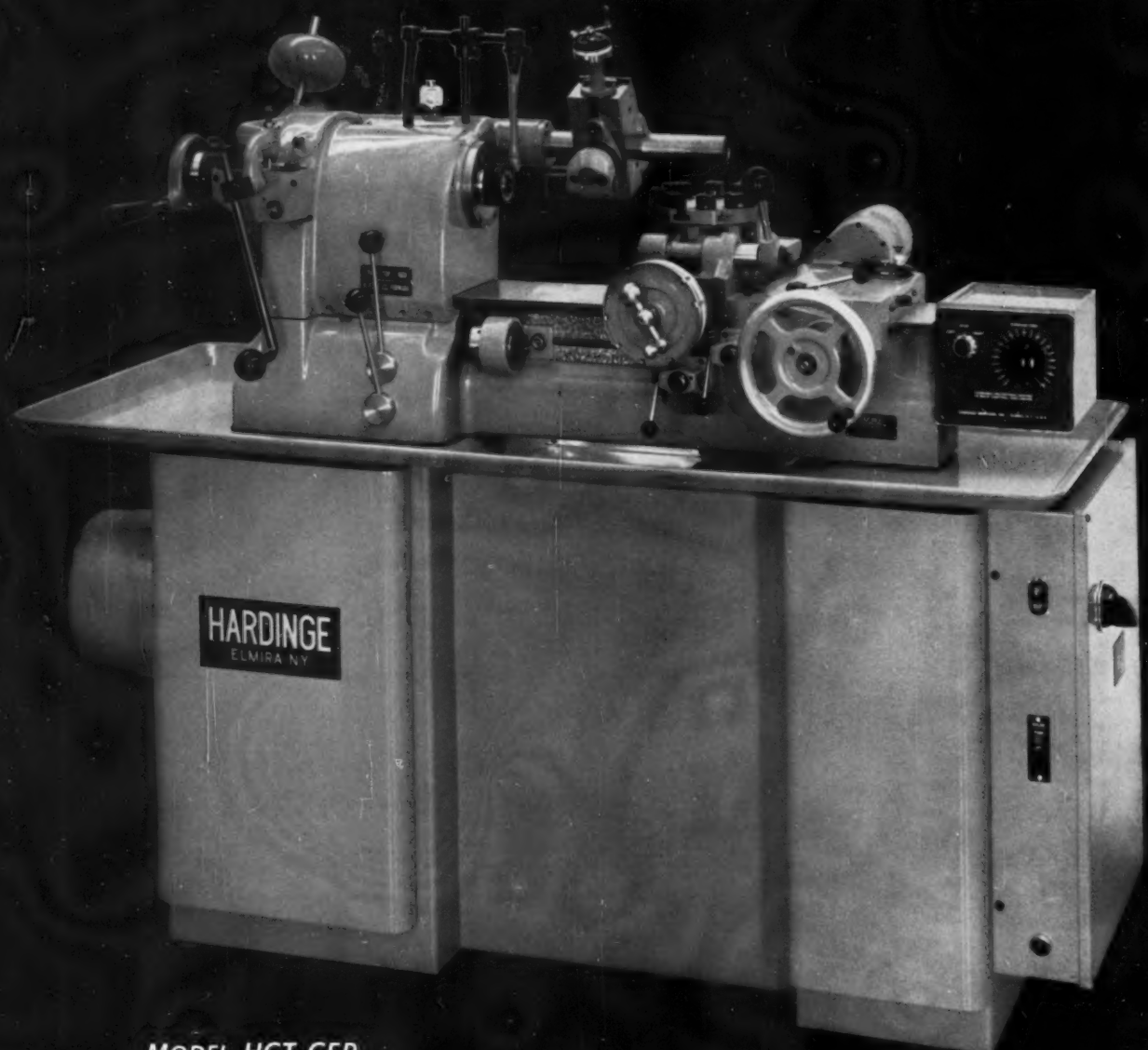
- NEW ELECTRIC PRODUCTION DRIVE
- NEW POWER CROSS FEEDING TURRET
- NEW HARDINGE EASY READING BLACK AND WHITE DIALS



MODEL HCT-CFR

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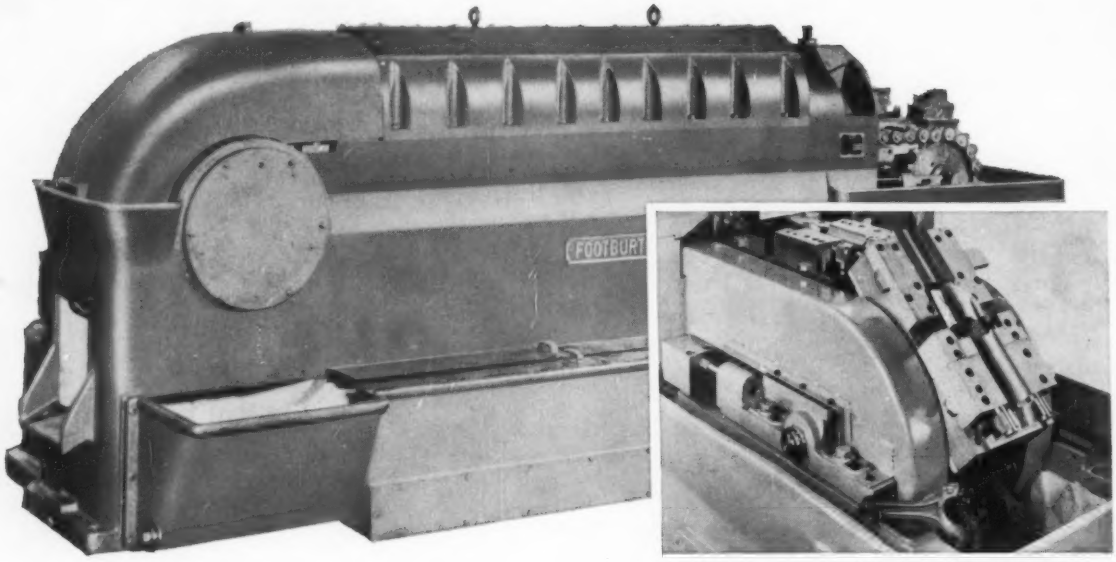
HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

ENGINEERED FOR PRODUCTION

Continuous type broaching machine built in five sizes.



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HARDINGE
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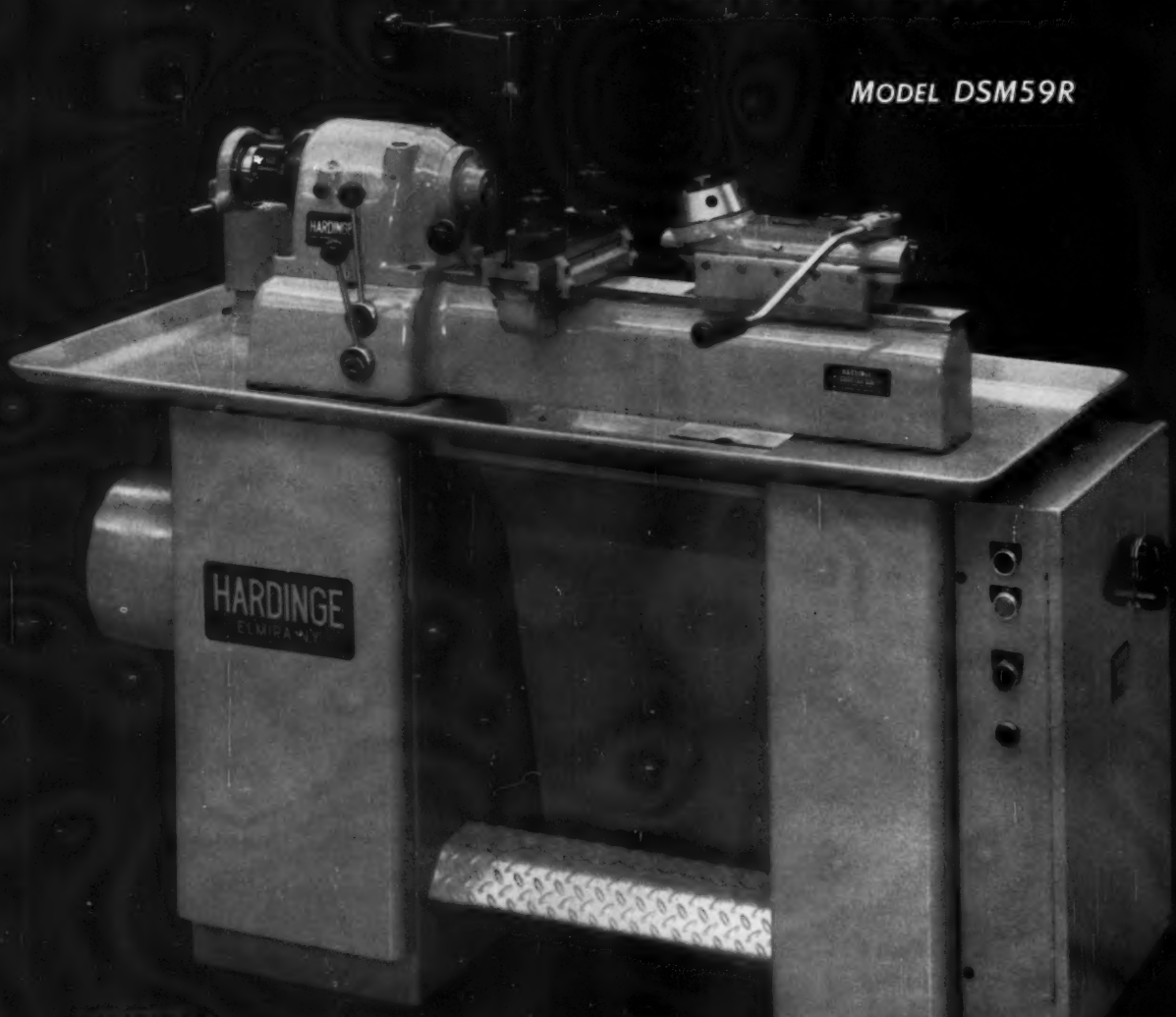
THE NEW

HARDINGE HIGH SPEED
SECOND OPERATION MACHINE

MODEL DSM59R



FEATURES:

- NEW ELECTRIC PRODUCTION DRIVE
- NEW PRELOADED BALL BEARING HEADSTOCK
- NEW ELECTRIC INTERLOCK FOR SPINDLE LOCK PIN
- NEW COOLANT FACILITIES WITH SELF DRAINING PAN

WRITE FOR FREE BULLETIN

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PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

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The CECOMATIC Forging Process, based on the revolutionary Chambersburg Impacter, makes possible the continuous and automatic production of precision drop forgings. If you are a manufacturer whose products include drop forged components, you must consider mechanized forging in your plans for the future . . . . . your competition will do so—sooner or later. Practical information, with examples of successful mechanized forging operations, are included in the brochure, "The Automatic Production of Forgings in Closed Dies". Write for a copy today, to Chambersburg Engineering Company, Chambersburg, Pennsylvania.

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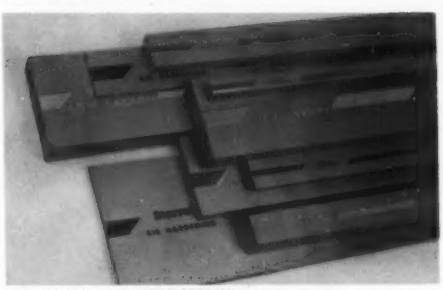
No. 657C Magnetic Base Indicator Holder with No. 196B Indicator illustrated above

PRECISION MEASURING TOOLS



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Starrett ingenuity gives skilled craftsmen every incentive to do the job right with the right tools for the job. In dial indicators and gages, there is a wide choice of types . . . each with unique features, all with the same high standard of accuracy and reliability.

The complete line of Starrett products is always readily available through your nearby Industrial Supply Distributor. Write for complete catalog No. 27. Address Dept. D, The L. S. Starrett Company, Athol, Massachusetts, U. S. A. . . .

World's Greatest Toolmakers

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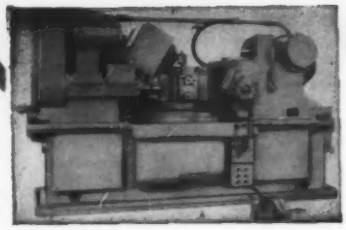


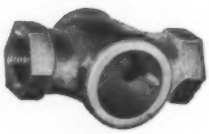
GOSS & DE LEEUW AUTOMATIC CHUCKING MACHINES

perform one to three operations in sequence or simultaneously . . .

TO CUT PRODUCTION COSTS...

More completely finished parts at the end of the day with no partly finished pieces lying around is the regular accomplishment of Goss & De Leeuw "1-2-3" chuckers. It means complete finishing on one, two or three ends simultaneously or in sequence without tool resetting, rechucking or parts handling. Machining operations may include boring, facing, turning and threading.

Change over from job to job is simple. Cost-cutting is assured on long or short runs. Goss and DeLeeuw Chucking Machines are the only standard machines of their type which operate the "1-2-3" way to reduce costs per piece and step up the number of pieces per hour.



MMT-PE MODERN MACHINE TOOLS PRODUCTION EFFICIENCY

Investigate the opportunities offered by these machines on your production by sending samples of your work for time and cost estimates—Ask for illustrated descriptive literature.

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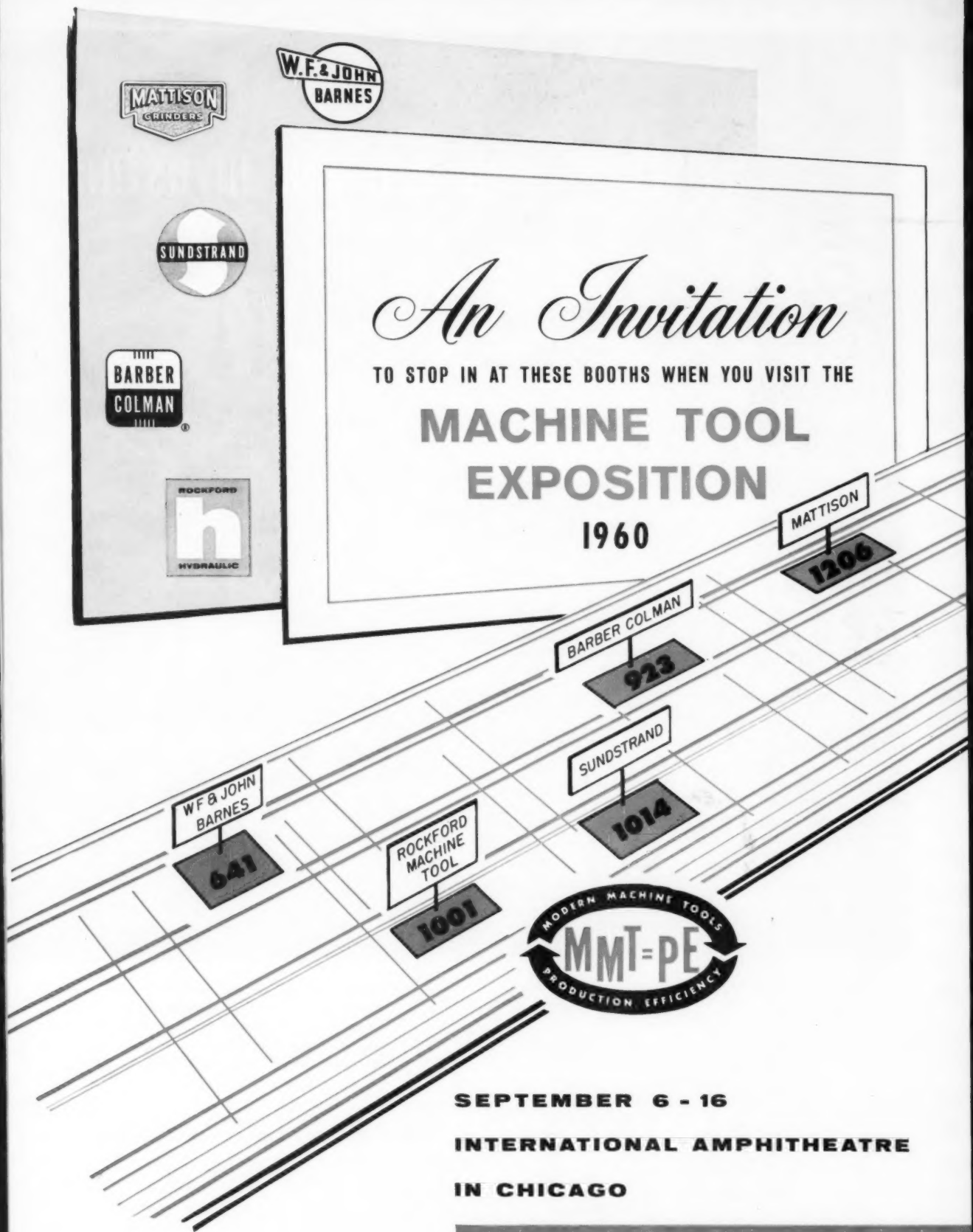

SEPTEMBER 6 - 16

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ROCKFORD INSERT GROUP

September, 1960

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32" x 24" x 66"

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Hundreds of these machines are now in production service, proving the design and efficiency needed for competitive production. Real production efficiency results from low initial cost, high performance rating, and minimum maintenance required.

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FOR WIDE-RANGE FLEXIBILITY —

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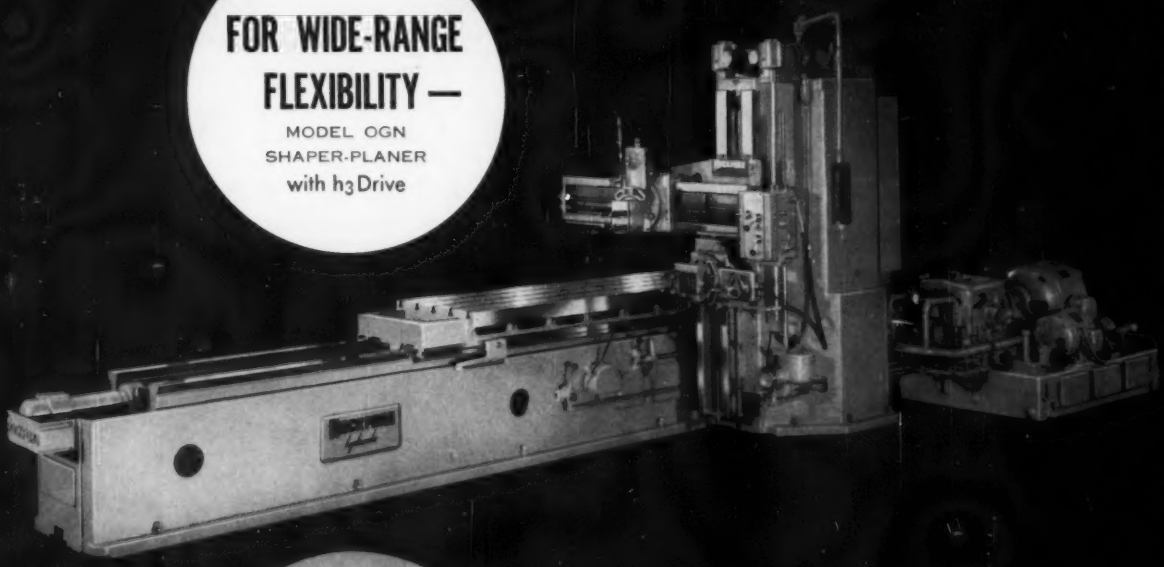
SHAPER-PLANER
with h_3 Drive



ONE MACHINE PROVIDES 3 DISTINCT CUTTING RANGES
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optimum efficiency

low range to 100 fpm . . . for extreme depth of cut and maximum feeds, with high-speed steel tools.

medium range to 150 fpm . . . for average cuts in medium steel and cast-iron.

high range to 300 fpm . . . for carbide planing of steel and non-ferrous metals.

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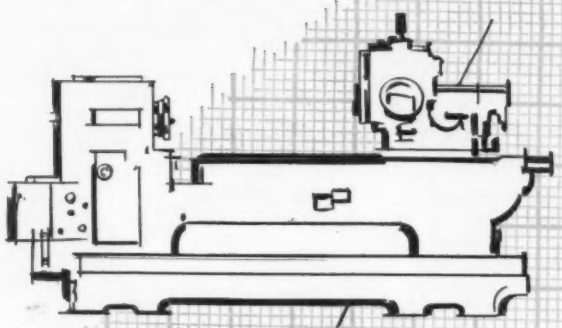
MODERN MACHINE TOOLS MMT-PE PRODUCTION EFFICIENCY

CITY OF MACHINE-TOOL SPECIALISTS **ROCKFORD, ILLINOIS, U.S.A.**

See these new Sundstrand

AT BOOTH No. 1014

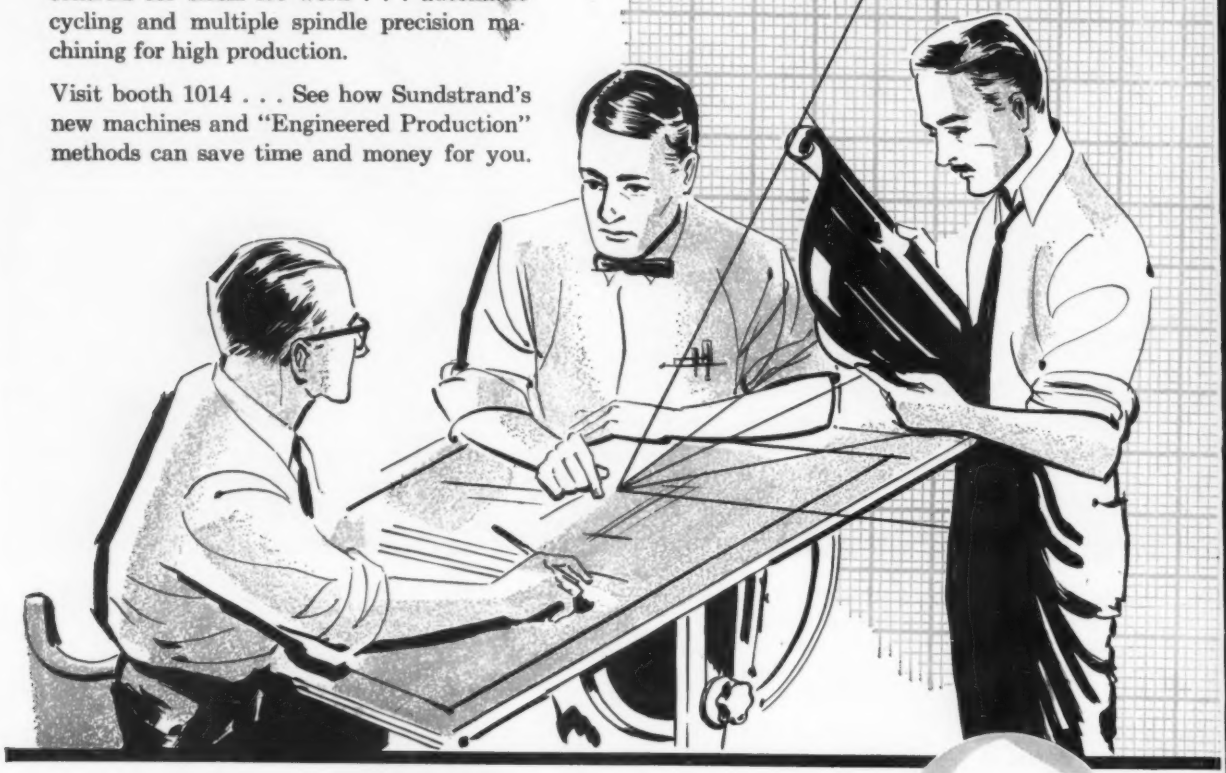
Machine Tool Exposition,
September 6, 1960
International Amphitheatre,
Chicago, Illinois



Thread milling machine with sine bar adjustment.

See these new cost reducing Sundstrand machines for milling, turning, grinding, broaching, drilling, and thread milling operations. See ease of set-up, adjustment, and numerical controls for small lot work . . . automatic cycling and multiple spindle precision machining for high production.

Visit booth 1014 . . . See how Sundstrand's new machines and "Engineered Production" methods can save time and money for you.



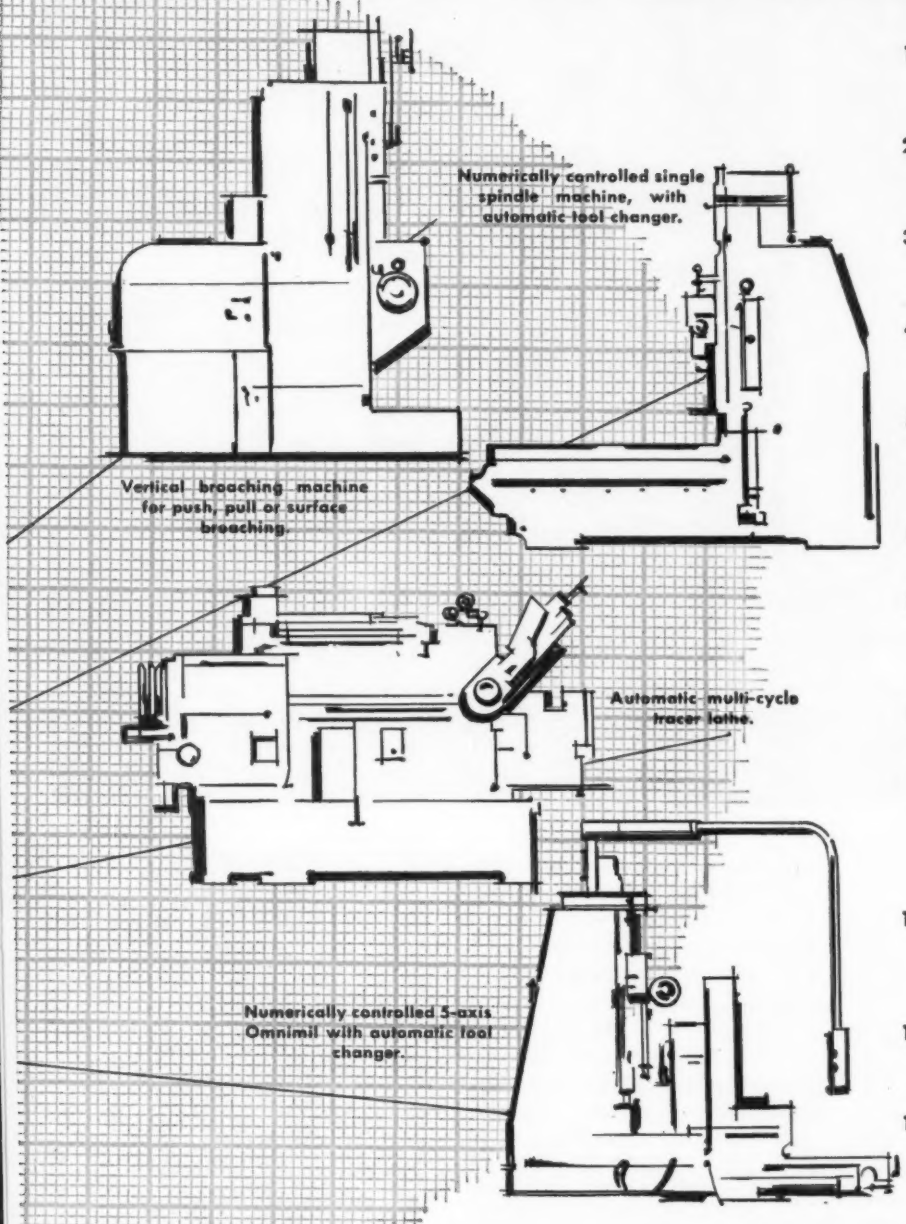
MMT=PE

Modern Machine Tools = Production Efficiency

SUNDSTRAND

MACHINES DESIGNED TO MEET YOUR NEEDS ROCKFORD, ILLINOIS, U.S.A.

Machines in action...


Numerically controlled single spindle machine, with automatic tool changer.
Vertical broaching machine for push, pull or surface broaching.
Automatic multi-cycle tracer lathe.
Numerically controlled 5-axis Omnimil with automatic tool changer.

1 Three axis numerically controlled vertical spindle machine with 20-position tool changer.

2 Precision multiple spindle drilling, boring, reaming or tapping machine.

3 Automatic universal thread-milling machine has simple dial setting . . . no cams to change.

4 Vertical knee-type milling machine has precision angular boring or milling spindle.

5 Multi-cycle tracer lathe with indexing turret for ruff and finish cuts and cross-feeding slide for facing cuts.

6 New design multiple-tool automatic lathe.

7 Vertical broaching machine has "building-block" principles for easy conversion to pull-up, pull down or surface broaching.

8 New conveyor type abrasive belt grinder.

9 New centerless abrasive belt grinder, with micrometer in-feed of regulating wheel, assures precision size control of work ¼" to 4½" diameter.

10 Rotary surface grinder has automatic cycling for production work and convenient controls for precision tool room grinding.

11 New universal bed-type Rigid-mil with 50 h. p. horizontal and 20 h. p. all angle head.

12 Numerically controlled 5-axis Omnimil, with 60-unit tool changer.

SUNDSTRAND MACHINE TOOL BELVIDERE, ILLINOIS • DIVISION OF SUNDSTRAND CORPORATION

CITY OF MACHINE-TOOL SPECIALISTS ROCKFORD ILLINOIS U.S.A.

Basically mechanical . . . reduces complex electronics. Positive control by direct actuation (no feedback). All controls fully integrated with the machine. So practical it needs no provision for manual operation.

Barber-Colman's New Tape-Controlled Lathe

Tape-r

Understands two languages: . . . digital data and cost

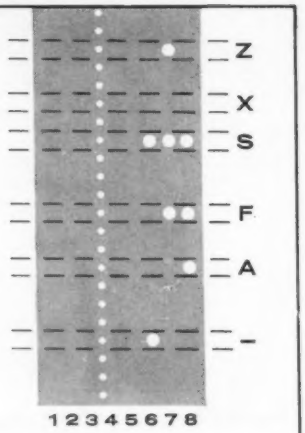
Now, you can gain all practical advantages of numerical control in a Barber-Colman precision lathe that greatly reduces complexity and equipment cost while retaining the ability to turn tapers and form simple radii.

Here is a fresh new approach to numerical control — one that removes any fear of systems incompatibility and leapfrogs into tomorrow's practicalities of low-cost operation and maintenance.

Now, you can sit in the driver's seat — relieve operating personnel of size control responsibility and set production rates on 90% of your routine jobs fitting a 16" swing lathe. The new Tape-r-guide handles all stop-start, positioning, speed adjustment, and feed change functions automatically from a simple 8-channel binary code tape. It will hold close tolerances on diameter and length, machine all practical tapers without "hunting," cut chamfers without special tools, cutoff and bore or machine at 90° to the work axis —all on a high-performance, precision lathe that has the simplified version of numerical control built-in.

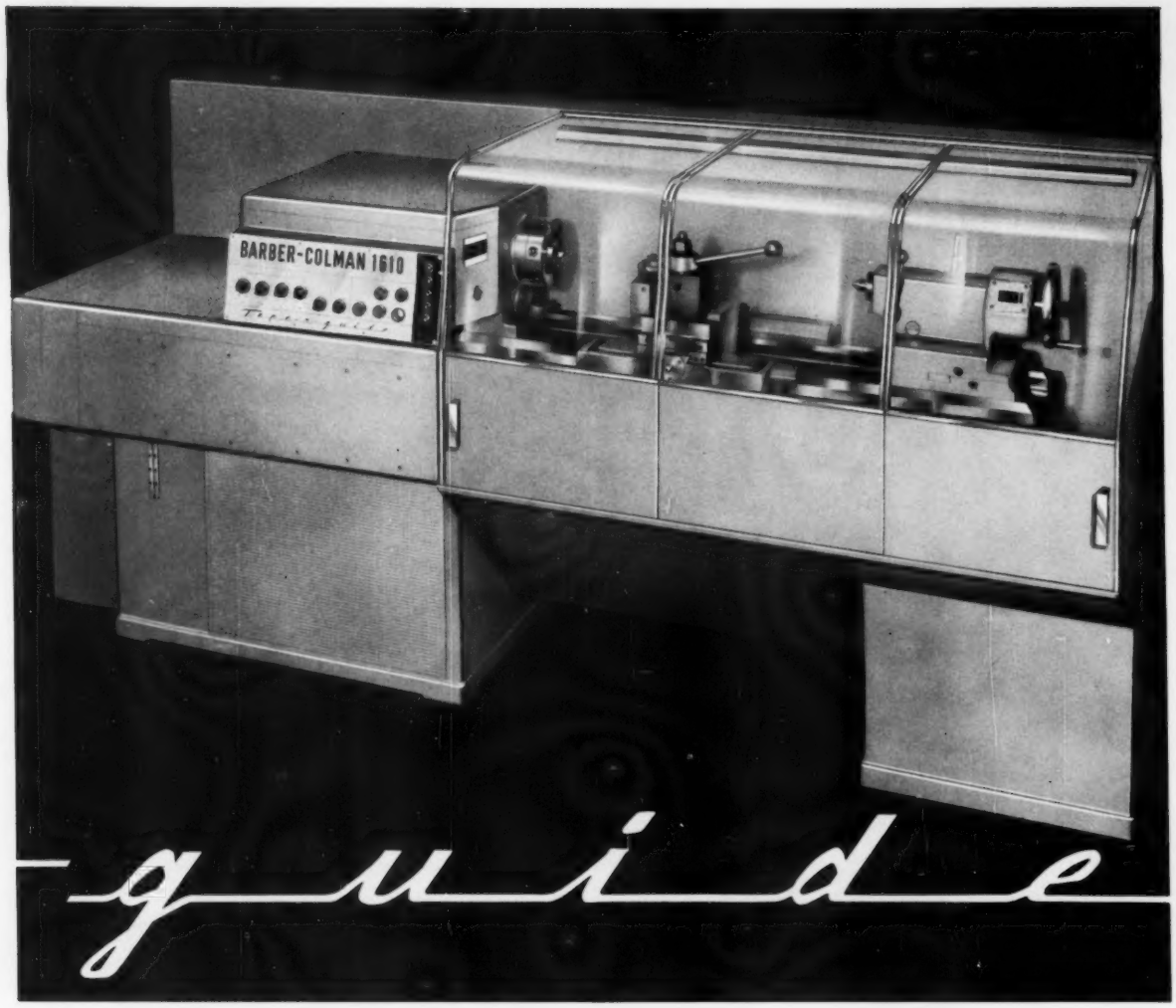
The reader is part of the headstock. Controls are housed in the electrical panel on the back.

The big difference in Tape-r-guide is emphasis on simple and direct mechanical actuation. For example, compound differentials accurately control tapers. Relative speeds of the carriage and cross slide, controlled through mechanical clutches in gear trains, give you true angular tool



Simple coding . . . there are only six types of commands, and only one row is needed to give a complete "axis" command. The channels numbered one through five control rates, while the last three channels identify the command.

CENTER OF MACHINE-TOOL EXCELLENCE **ROCKFORD, ILLINOIS, U.S.A.**



paths. There's no sensing and correcting of errors as with a servo drive — no complex electronics or data storage. An electrical signal from the tape reader initiates the mechanical cycle. Cycle then establishes feed rate, spindle speed, and direction . . . as well as any auxiliary functions.

The tape-coding system is simple. Only one row is needed on the tape for a complete axis command. Thus, only a few rows are required for each complete command sequence.

As an incremental system, coding is started from the first operation of the tool rather than from an absolute zero point. The over-all accuracy of the machine is limited only by the system resolution capability . . . plus or minus .001" on diameter and length. The lathe itself is the largest machine of its type on the market, produces super finishes and precision tolerances — fast. It has large swing capacities (16" and 20"), infinitely variable spindle speeds to 1200 rpm, rapid traverse of the cross slide and carriage, rugged frame castings made of dense Meehanite metal. All setup and operating controls are centralized on the headstock panel, adjacent to the tape reader.

Four dials for preselecting spindle speeds are actuated by tape commands at the proper time in the cycle. Another selector puts the machine into single-cycle operation for setup or fully automatic cycling.

Ask your Barber-Colman representative about the low cost of this basically mechanical, fully integrated, high-speed, numerically controlled lathe.

MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY

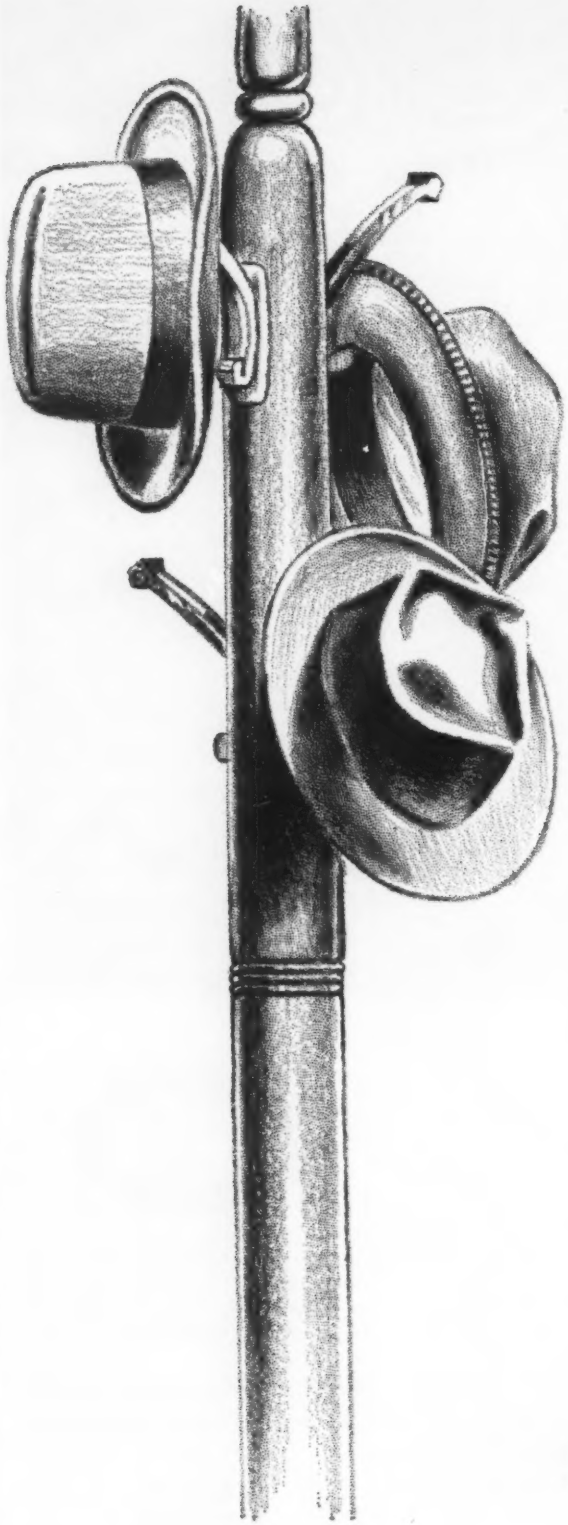
See the tape-controlled lathe turning tapers, too, in Booth 923 at the Exhibition. Qualified engineers will be on hand to answer questions.

Barber-Colman Company

BARBER COLMAN ®

92 Loomis Street, Rockford, Illinois

CITY OF MACHINE-TOOL SPECIALISTS ROCKFORD ILLINOIS U.S.A.



It's so easy to work with Greenlee!

You take a big step in solving machining problems of manufacturing when you call in the Greenlee man. He's used to working with all levels of management, production and engineering. While he doesn't claim to know all the answers, his broad background and experience can be mighty helpful . . . time-wise and cost-wise. Write or call for the rest of the story.

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Multiple-Spindle Drilling and Tapping Machines
Transfer-Type Processing Machines
Hydro-Borer Precision Boring Units
Automatic Bar Machines (Six and Four Spindles)
Die Casting Machines
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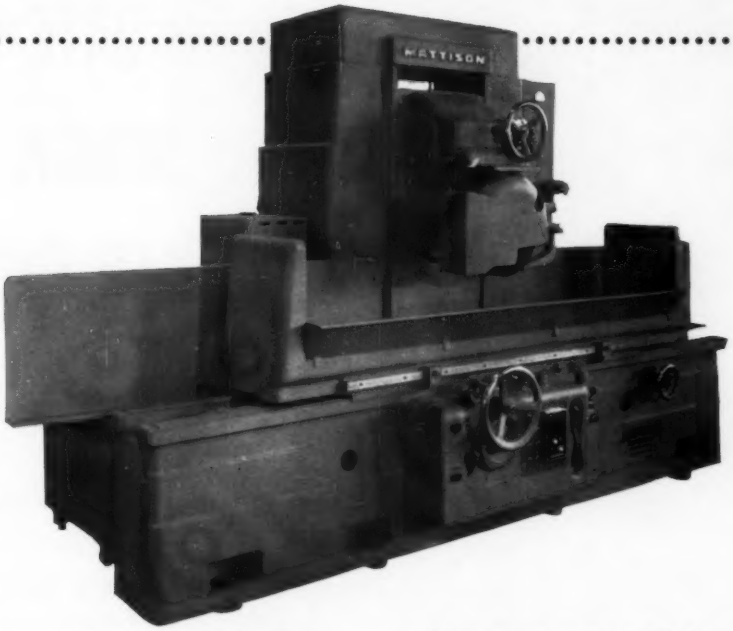
MACHINES DESIGNED TO MEET YOUR NEEDS ROCKFORD, ILLINOIS, U.S.A.

MATTISON
HIGH-POWERED
PRECISION

GRINDING METHODS

New Mattison Horizontals speed precision surface grinding

MMT-PE



Here is Mattison's new line of horizontal-spindle surface grinders, with more rigidity, more power actuation, and more automatic features to speed work and control your quality.

Here, in surface grinders ranging from 36″ to 192″ in table length, is all the precision you need for toolroom surface grinding, plus high production capacity for the shop. Here is "hogging" power and rigidity combined with high sensitivity of a light-duty machine tool.

Operation of the new Mattison is easier and more automatic because cross feed is electronically controlled in both directions. The operator just presets the feed increment and reversal points on the new illuminated station—the wheel slide automatically feeds and stops within ± 1/16″ of either edge without work stoppage. Twin cylinder actuation assures uniform speed of the cross slide. With optional automatic downfeed, electronic reversal makes grinding easier than ever.

Automatic cross feed resets after wheel dressing

Should the operator override the automatic feed to dress the wheel, simply releasing the manual lever causes wheel slide to reset itself to the correct direction and resume operation between preset reversal points.

On long grinding operations, Mattison's new power downfeed increases productivity greatly. Amount of downfeed is set to a predetermined stop, from .001″ to .400″, in increments of from .0002″ to .004″ in ranges. On plunge grinding operations, downfeed actuation can be controlled by table reversals. Or, when grinding in the conventional manner, it may be controlled from cross slide reversals. A microswitch shuts off the feed at a predetermined depth of cut, after which the machine sparks out. This new feature is optional on all new horizontals.

Box-type construction increases rigidity and sensitivity

Performance has proved the superiority of our double-column machine—and now the Meehanite columns, wheel slide, and spindle housing all are beefed up and functionally changed to bring you the finest double-column design ever. Wide, deep, box-type columns are bolted and doweled to the Meehanite base and reinforced at the top by a heavy connecting brace. This gives you rigidity of a one-piece casting. The 30″, 36″, and 42″ machines are standard equipped with hydraulic counterweighting. This permits you to preload the feed screw in either direction increasing control on precision work.

New system of ways and gibbing permits closer adjustment and accentuates the machine's sensitivity to fine-feed actuation.

Table speeds increased through variable volume pump

You can take advantage of high horsepower and rigidity because Mattison table speeds go up to 125 ft per minute, or more. The new style pump has internal hydraulic reversing, for quieter, smoother, and cooler operation. Complete hydraulic unit is isolated from the machine, avoiding heat build-up and possible distortion of the table or work.

Power assist simplifies manual control

A new auxiliary power system permits the operator to control table positioning more easily and precisely by hand instead of by jogging the hydraulic system. Optional power assist on large machines permits fingertip actuation through the handwheel, even when positioning a table load of heavy castings. This facilitates dressing the wheel from a table-mounted diamond or crush roll. All levers and handwheels on this machine are directional.

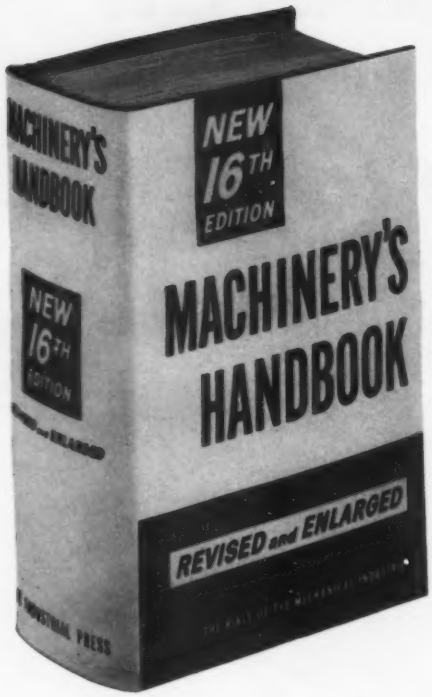
If you have large accurate parts . . . if you are a volume producer of precision-ground flat stock . . . or if you just want to increase productivity in the toolroom, contact your Mattison dealer for information on this new line of high-powered precision surface grinders.

MATTISON MACHINE WORKS
Rockford, Illinois **Phone: WO 2-5521**

MATTISON

HIGH-POWERED PRECISION SURFACE GRINDERS

FOR PRODUCTION MACHINE TOOLS IT'S **ROCKFORD, ILLINOIS, U.S.A.**



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over 500 completely new pages of reference information and data

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And now, in this greatly revised and enlarged edition, you get all the latest and best principles, practices, specifications, standards and other useful working data. The 16th Edition reflects the tremendous advances the metalworking industries have made; and it gives you the information you need to keep pace with that progress. The comprehensive cross-index and the convenient thumb-index will help you find any one of the subjects in seconds!

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FLEXIBILITY

Lucas provides

Lever control.

Pendant control

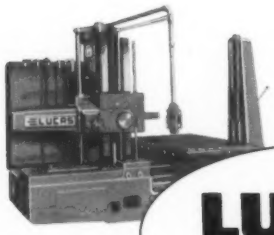
Tape control

and a variety of combinations of the three for flexibility of control suited to the type of work required.

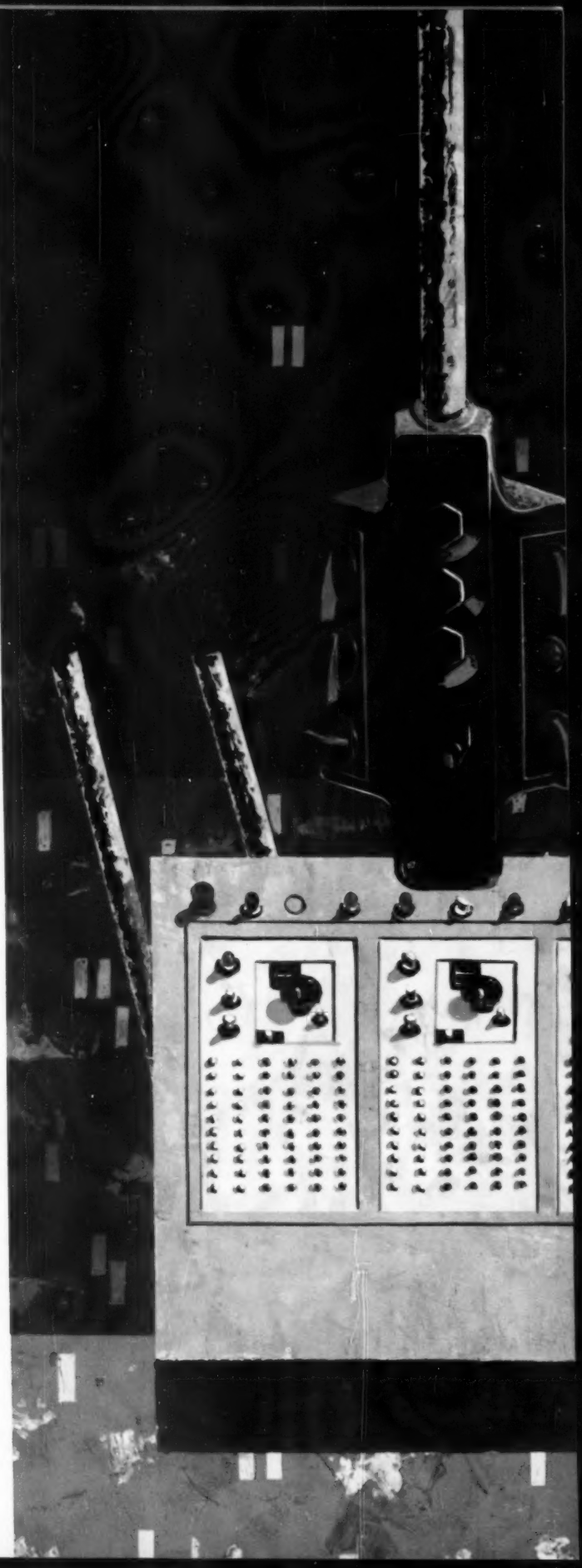
For example . . . The Multiple Control Pendant selects speeds, feeds, unit travels, rapid traverse of head, table, saddle and spindle, plus the rotation of the spindle forward and reverse, jog and stop. Speeds and feeds can be pre-selected while the machine is in operation.

Practical applications of these controls are spelled out in a new catalog. Write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of flexibility . . .

think of . . .



LUCAS
PRECISION



When you think of VERSATILITY

Lucas feeds the saddle ⇐

Lucas feeds the spindle ⇒

Feeds both in combination ⇒ ⇐

when necessary.

Combine these motions with

Vertical spindle head travel ⇕

and horizontal table travel ⇔

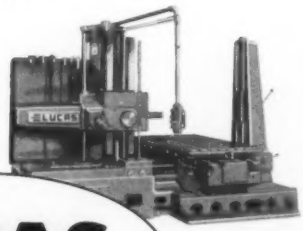
and a rotary table ↻

if you need it.

The result . . . no machine tool can offer a greater combination of usable motions for boring, drilling, milling and related work.

Over twenty models and a dozen major attachments. Write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of versatility . . .

think of . . .



LUCAS
PRECISION

ANNOUNCING

21

NEW EX-CELL-O PRODUCTION EFFICIENCY BREAKTHROUGHS

See these 21 features at

EX-CELL-O's BOOTH 946

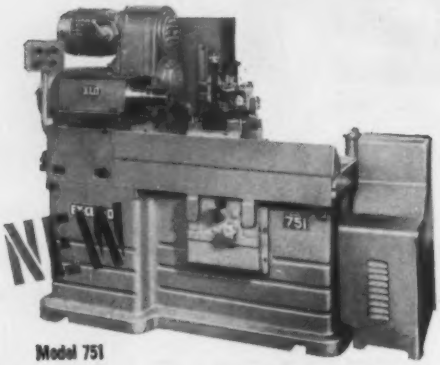
Machine Tool Exposition, Chicago, Sept. 6-16.

MODERN MACHINE TOOLS
MMT PE
PRODUCTION EFFICIENCY

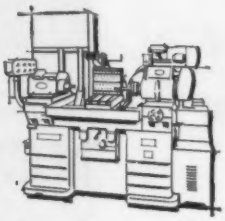
NOTE: Immediately following these 4 Ex-Cello-O pages you'll find ads for Bryant Chucking Grinder Co. and Michigan Tool Co.—subsidiaries of Ex-Cell-O.

ANNOUNCING 21 NEW EX-CELL-O

NEW LINE OF PRECISION BORING MACHINES

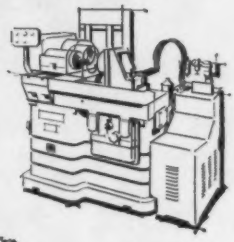


Model 751

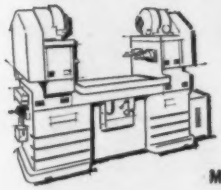


Model 732

NEW



Model 731



Model 752

1. Temperature controlled hydraulic panels
2. Greater rigidity and stability in bases and tables
3. Hydraulic and coolant systems externally mounted
4. New standard heavy duty spindles

Maximum dimensional stability under all kinds of operating conditions, and accurate repeatability on boring, turning, facing, counterboring, chamfering, recessing and trepanning operations are the forte of this new line of Ex-Cell-O Standard Precision Boring Machines.

NEW MODEL 973 GROOVE GRINDER

1. Positive cam control of variable wheel feed and sparkout
2. Hydraulically operated cross slide movements

Maximum speed and precision in the grinding of single, or multiple, grooves or forms mark this new machine's potential for breaking production efficiency barriers.

MODEL 411 VERTICAL BORE

1. Single column construction
2. Seven different arrangements available

Versatility is the production efficiency feature of the new Model 411 Ex-Cell-O Vertical Precision Boring Machine. Easy tool changing and safe, easy, loading of heavy parts also contribute to this precision machine's effectiveness.

60—65B

PRODUCTION EFFICIENCY BREAKTHROUGHS

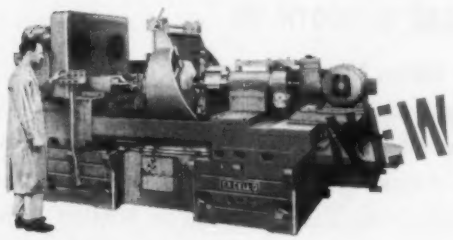
MODEL 922 NUMERA-TROL

9 Slides controllable to 25 millionths of an inch

10 Lead time, tooling, engineering and production costs minimized

The Model 922, a two dimensional tape controlled, ultra-precision machine tool for turning or boring intricate contours or grinding cams and templets. Designed to operate from any high performance numerical control system, it's a most effective means for reducing metalworking overhead.

LARGEST PRECISION BORING MACHINE



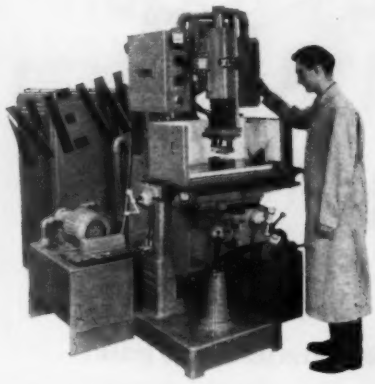
11 Massive, heavy construction

12 Hydraulics—infinite feeds, thrust-load compensation

Accuracy, heavy cuts and good finishes on large parts are the high-production characteristics of the Ex-Cell-O Model 772 Horizontal Precision Boring Machine. This largest horizontal boring machine in the Ex-Cell-O line is designed for maximum machine cycle efficiency.

60—65C

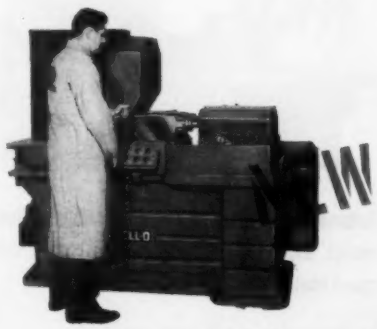
MODEL 244 VERTICAL ELECTROSPARK MACHINE



13 Electrodes of various materials are used to form intricate shapes in hard conductive materials

For fast and accurate drilling, piercing, trepanning and cavity sinking in carbides, die steels, etc. The Ex-Cell-O Vertical Electrospark Machine offers all the advantages of electro-discharge machining.

MODEL 308 CAM BORE

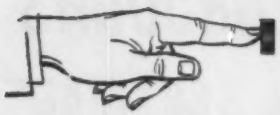


14 Positive, direct cam control, no levers, on table and cross slide

15 Fast, easy, cam changing for maximum versatility

On production parts requiring close-tolerance contouring, boring, turning, facing and grooving—singly or in various combinations—the Ex-Cell-O Models 308 and 312 Cam Boring Machines feature reliable repeatability for high production and quality.

MORE EX-CELL-O ANNOUNCEMENTS



ANNOUNCING 21 NEW EX-CELL-O PRODUCTION EFFICIENCY BREAKTHROUGHS

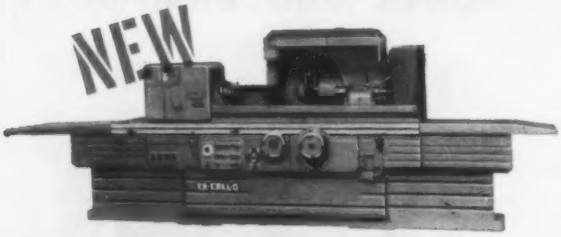
MODEL 264 ELECTROLYTIC TOOL GRINDER

16 Cuts diamond wheel costs

17 Grinds both tool faces and chip breakers

Face grinding on one end and chip breaker grinding on the other —this Reciprocating Tool Grinder grinds high speed steel and carbide tools to blue print specifications quickly, at low diamond wheel cost, and without risk of heat checking.

MODEL 36 THREAD GRINDER



18 Automatic wheel dressing, size compensation, wheel feed, retract, extra long leads, backlash compensation, and work speed control

19 For production or tool room use

The hydraulically operated and electrically controlled Model 36 Thread Grinder produces accurately ground threads, internal or external, with minimum waste of time, labor or material. Single or multiple rib wheels may be used.

MULTIPLE SPINDLE PRECISION BORING

20 Interchangeable multiple-spindle plates

21 Fully automatic cycle for multiple hole precision boring

Full utilization on many jobs is afforded through the easily-changed multiple-spindle plates featured on Ex-Cell-O's Models 711 and 712 Precision Boring Machines. Built-in cross slide permits indexing between bores or sets of bores.

ALSO IN BOOTH 946

■ Building Block Set-ups ■ Center Lapping Machine ■ Grinding Wheel Dressers ■ Grinding and Boring Spindles ■ Quill-type Hydraulic Power Units ■ Drill Jig Bushings ■ Micron Sections ■ Precision Production Parts ■ Continental Broaches, Cutting Tools, Counterbores ■ Rotac Torque Actuators ■ Magna-Sine Magnetic and Non-Magnetic Sine Plates ■ Bryant Gages and Surface Plates ■ Cadillac Gages ■ Contour Projectors and Accessories

60-D

EX-CELL-O FOR PRECISION

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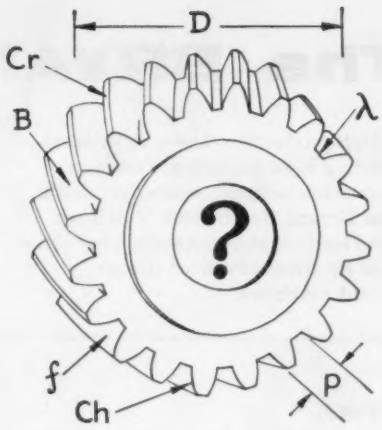
Machinery Division

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN



12 NEW GEAR IDEAS SPELL BONANZA

Cut Out Surplus Setup Time

You can do exactly that with Michigan-Lorenz line of universal hobbers and shapers (Models up to 200 in.). No change gears to bother with in selecting speeds and feeds on the hobbers. Just dial them in. You can't help but get better tool life. And their ultra-rigidity spells ACCURACY.

★Who Said You Can't Make Gears Any Better?

There is a simple way to make even the best gears better – give them a final touch-up (after heat-treat) on a Michigan abrasive gear finisher. Improves the surface finish, takes out the burrs and tiny nicks from handling, pulls noise level way down. (Yes, it even corrects small lead errors.) Part of the secret is in Michigan's exclusive Roto-Lube coolant, incidentally. Ask for Bulletin 999-60.

★Tiny Grinding Wheels Do Big Job

It's fascinating to watch those tiny grinding wheels race around both ends of gear teeth on the Michigan 482 (for bevel gears) and 482A (for spur and helicals). In just seconds they deburr and chamfer the entire profile—top root and flanks—of every tooth on a gear. Ask for bulletins by machine number.

★Dial Type Loaders Cut Cycle Time

Dial type loaders which cut cycle time while protecting the machine against mis-cycling are now available on a variety of Michigan Tool machines including the Mark II gear finisher and the 999 abrasive gear finisher.

★It's Amazing What You Can Save With the Low-Cost #607

There's a bench type checking fixture that will handle gears up to six inches in diameter, will eliminate use of ball mikes, tells you if there is runout and how much, checks size to tenths and smoothness of rolling action. Ask for Bulletin 607.

★Forms Precision Spline and Thread in Seconds

Did you know you could perform multiple operations—like spline and thread rolling—in a single stroke of a Roto-Flo machine? It's being done successfully in regular production. What's more these machines are so versatile that they are being used for semi-job lot runs. Ask for Bulletin RF-60.

Plunge Feed Makes 1458-B Fastest Hobber

If you want to know what real hobbing speed can be, look into the Michigan 1458-B Ultra-Speed. Its infinitely variable feed rate is only part of the story. Designed for continuous production. Not recommended for job shops (a Michigan-Lorenz is best for that). Ask for Bulletin 1458-B-60.

★Play Safe With Package Tooling

Now from TWO Michigan Tool plants you can get package gear tooling engineered as a unit to give you perfect gears. Avoids such things as sharp fillets, poor cleanup, incorrect contacts, shaving cutters and master gears not being properly matched. "Package" covers hobs, shaper cutters, shaving cutters, abrasive finishers, master gears, etc.

★Now You Can Grind Crowned Gears To Tenths

A fully automatic gear grinder that maintains true involute form and produces either uncrowned or crowned gears (to radii of 0 to 12 inches). Automatic wheel dressing. Nothing for operator to do but load and unload. Highly versatile. Wide choice of setup possibilities. Roughs, semi-finishes and finishes in same automatic cycle. Ask for Bulletin CGG-60.

★A Gear Finisher You Set Up With Dials

That's what the new Mark II makes possible. And you can shave the gears straight, crowned or tapered or both tapered and crowned with just ONE attachment. More beef than any other shaver for top accuracy. Amazing ease of setup and a honey for automatic loading. Fastest cycle time. Modular construction. Plus a host of other features. Ask for Bulletin 870-60.

Gear Checkers Go Optical

The latest lead and involute checkers now carry optical heads that not only boost accuracy but also speed up the checking process. On lead checkers ask us for Bulletin 1218A-60; on involute checkers it's 1124-60. (Yes, you can do spacing on either one.)

★World's Fastest Gear Cutting Machine Now Has Through Feed

For cutting spur gears, splines, ratchets and other toothed forms there is just nothing anywhere that will touch the Shear-Speed. Now the Model #30 is available in an open double-column design, tied together across the top giving it even greater accuracy. See how easy automatic chip removal can be. Ask for Bulletin SS-60.

★ *On display at the National Machine Tool Exposition, Sept. 6-16.*

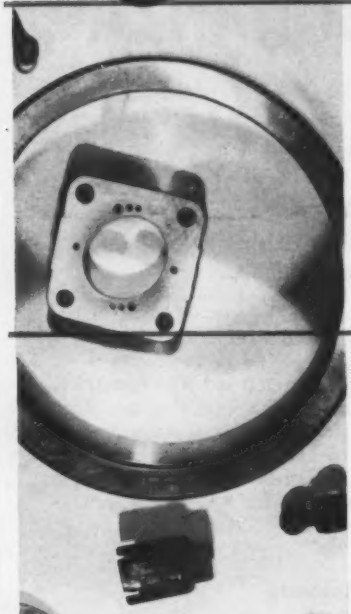
MICHIGAN TOOL COMPANY
7171 E. McNICHOLS RD. DETROIT 12, MICH.

MMT-PE

For more data circle this page number on card at back of book

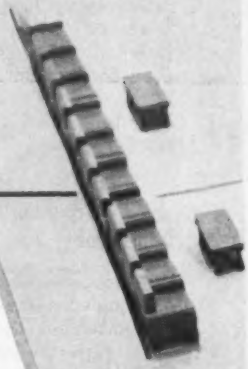
The BRYANT exhibit

If high-production, low-cost internal grinding is an important factor in your manufacturing operation, don't miss Bryant Booth #936. You'll see grinding done at eye-opening production rates by these advanced-design Bryant machines.



Bryant
UNIVERSAL Internal Grinder

A *completely new*, low-cost, general purpose machine for I.D., O.D., internal face and rotary grinding. Incorporates many plus values not found in other low-cost machines.

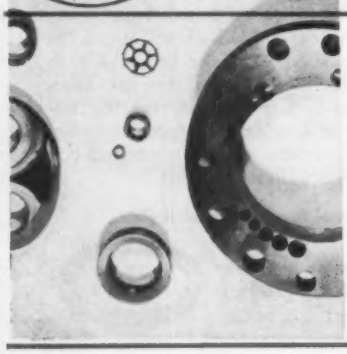


Bryant MODEL "B"
MINIATURE CENTALIGN®

Miniature Centaligns will demonstrate the grinding of minute bores and raceways in miniature bearing races. The Model "B" is a truly miniaturized machine, offering such noteworthy features as Bryant's production-proven disc drive workhead, quick-change "packaged tooling", and "New Wheel Dress" mechanism.

Bryant VERTICAL CAM Grinder

This vertically constructed machine greatly multiplies the production of contoured bores. The operation of the eccentric workholding fixtures in a horizontal plane increases production, loads faster and easier. This grinder is of Centalign unit type construction, requiring a minimum of floor space. The high-production grinding of contoured bores will be demonstrated.

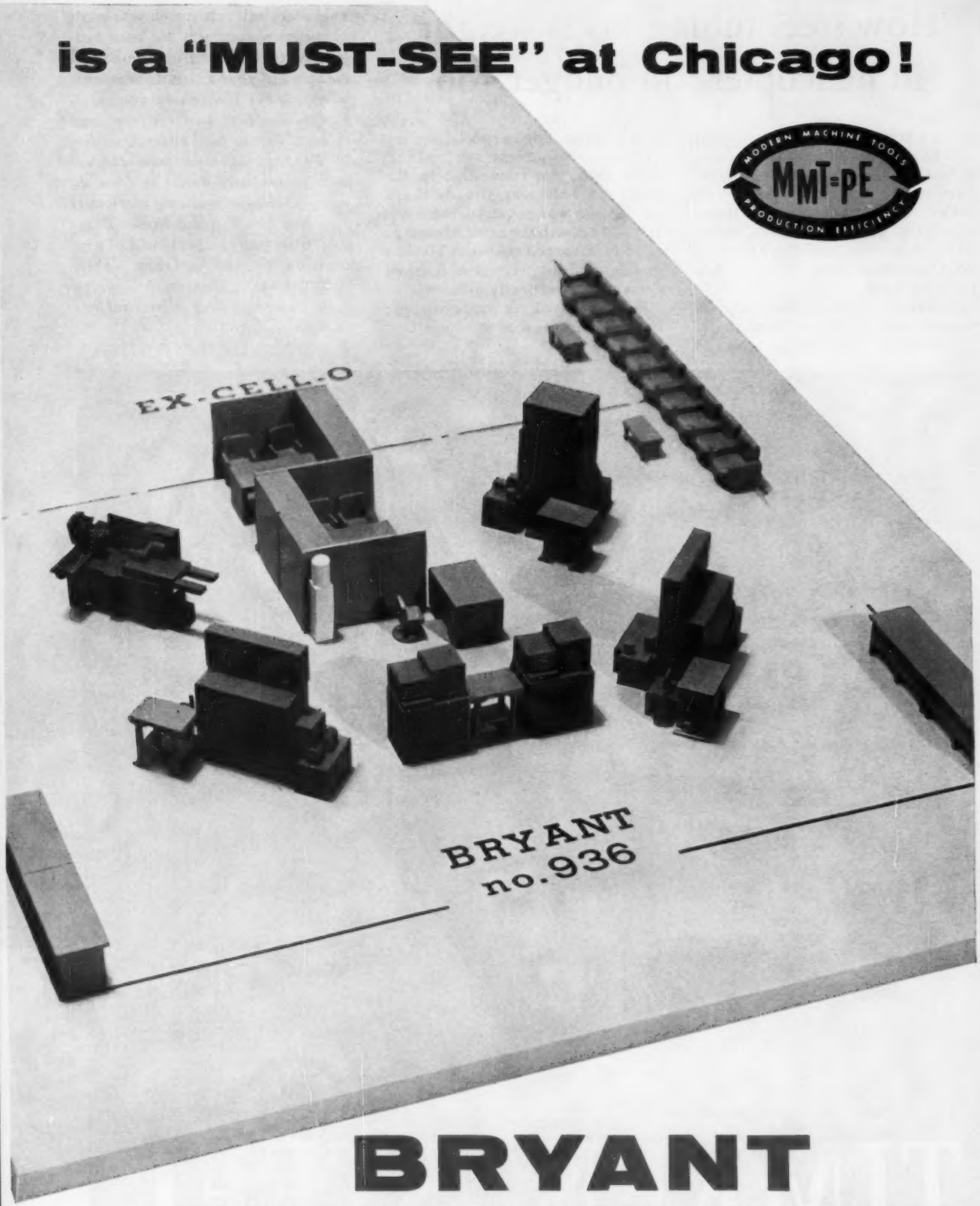


Bryant MODEL "C" CENTALIGN®

The standard for dependability, speed and accuracy in the world's major production lines. Featuring the exclusive Centalign wheelslide construction, cycle control by programming cams, and time-saving, split-second work handling.

is a "MUST-SEE" at Chicago!

MODERN MACHINE TOOLS
MMT=PE
PRODUCTION EFFICIENCY



BRYANT

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How steel tubing saves weight in helicopter...in budget, too

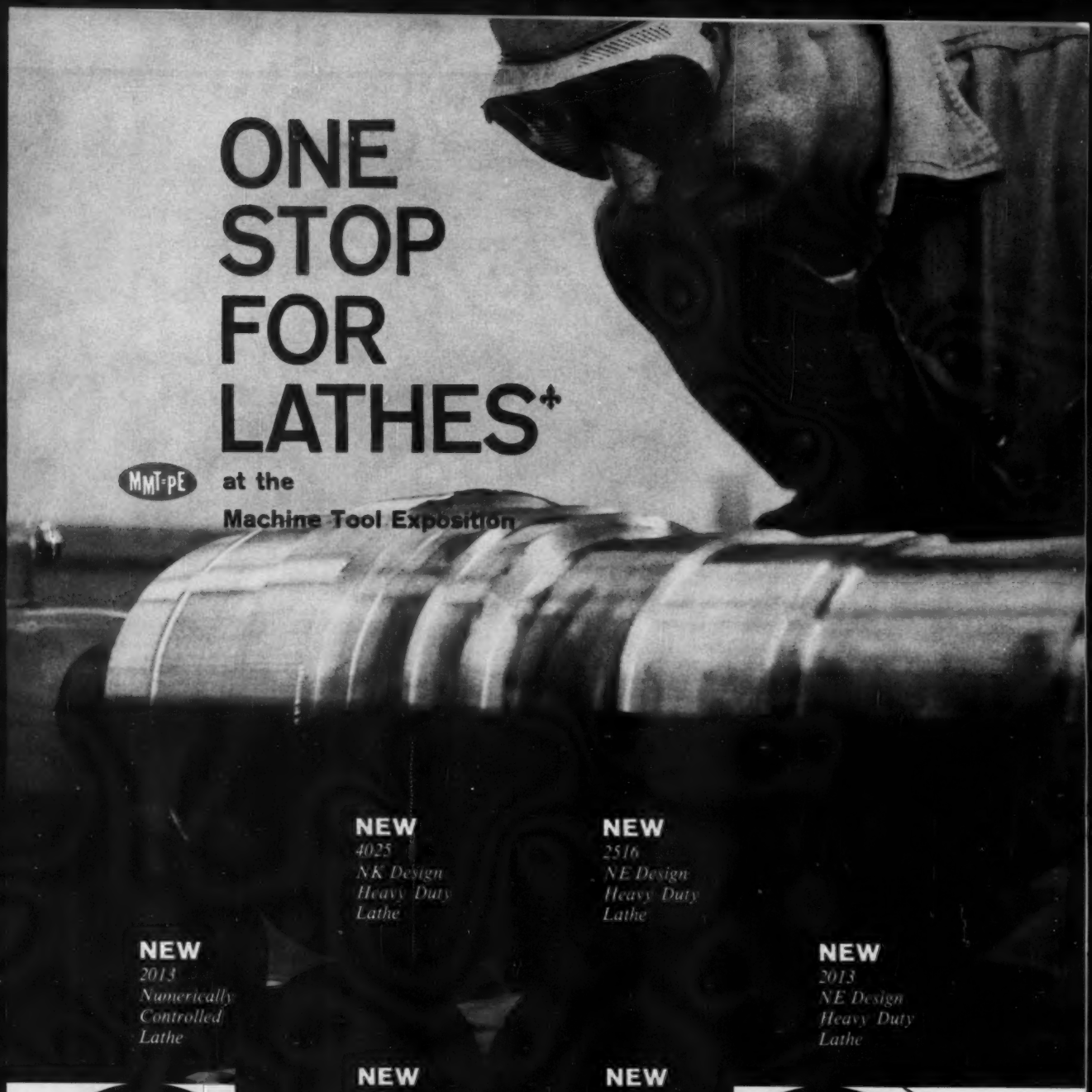
Shown below is the main rotor shaft of a new model helicopter. Because it was hollowed out of solid steel bars to save weight, it was costly to make. After machining to thousandths of an inch accuracy, previously undetected steel flaws showed up. One out of every five parts had to be rejected.

Timken Company Metallurgists were consulted. After careful study, they recommended a special analysis of Timken® seamless steel tubing. Savings began immediately. Because the hole was already there, no drilling was required. Steel was saved. And with the extra advantage of uniform forged quality in Timken seamless tubing, rejects of finished parts were practically nil.

Let us help you cut your costs, get better quality finished products. Our engineers will recommend the most economical tube size for your hollow parts jobs, one guaranteed to clean up to your finish dimensions. ***When you buy Timken steel you get...*** *1) Quality that's uniform from heat to heat, bar to bar, order to order. 2) Personal attention from the experts in specialty steels. 3) Over 40 years experience in solving tough steel problems.* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

TIMKEN STEEL

TIMKEN ALLOY STEEL AND SEAMLESS STEEL TUBING ARE AVAILABLE FROM STEEL SERVICE CENTERS IN 44 CITIES IN THE UNITED STATES



ONE STOP FOR LATHES*

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Regal
Lathe

NEW
19"
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Variable
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6 PC
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NEW Rapid Borer
Special 20" High Speed Lathe
and Other LeBlond Lathes

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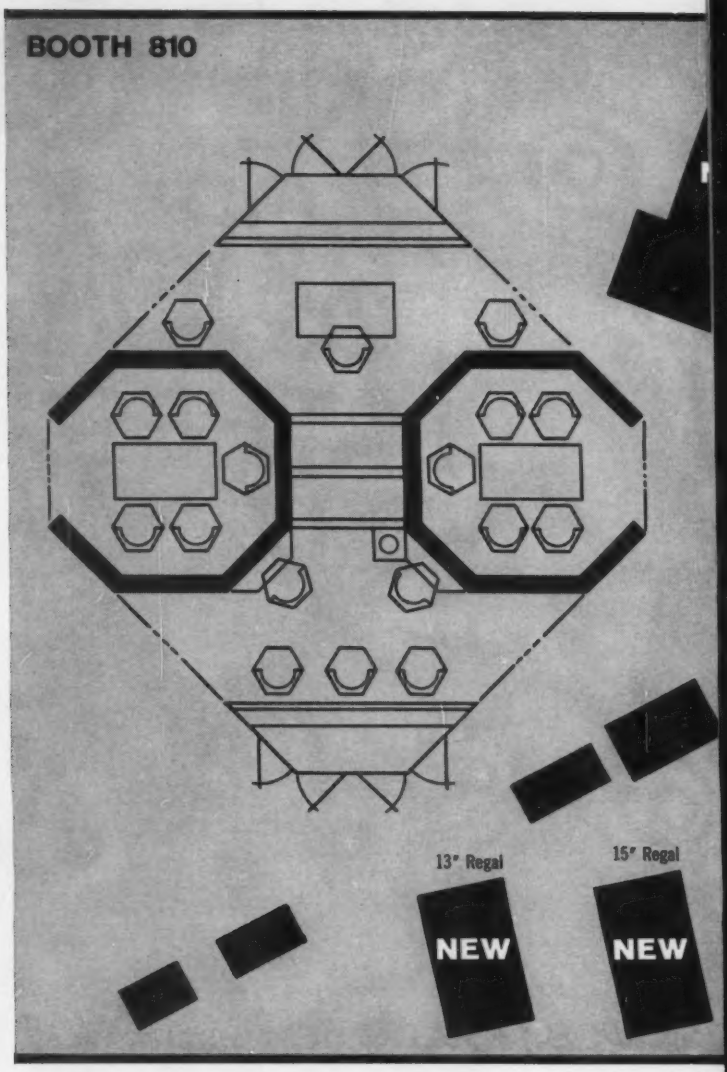
ONE STOP FOR LATHES+

at the

Machine Tool Exposition



Wherever you find lathes—in production, maintenance, toolroom and classroom—you will find LeBlonds doing a magnificent job. LeBlond is the world's largest builder of a complete line of lathes.

Choose the REGAL line for low priced lathes with big lathe features. These favorites for light production, maintenance, instrument work, training, and the toolroom are made in 15 different models from 13″ to 24″.

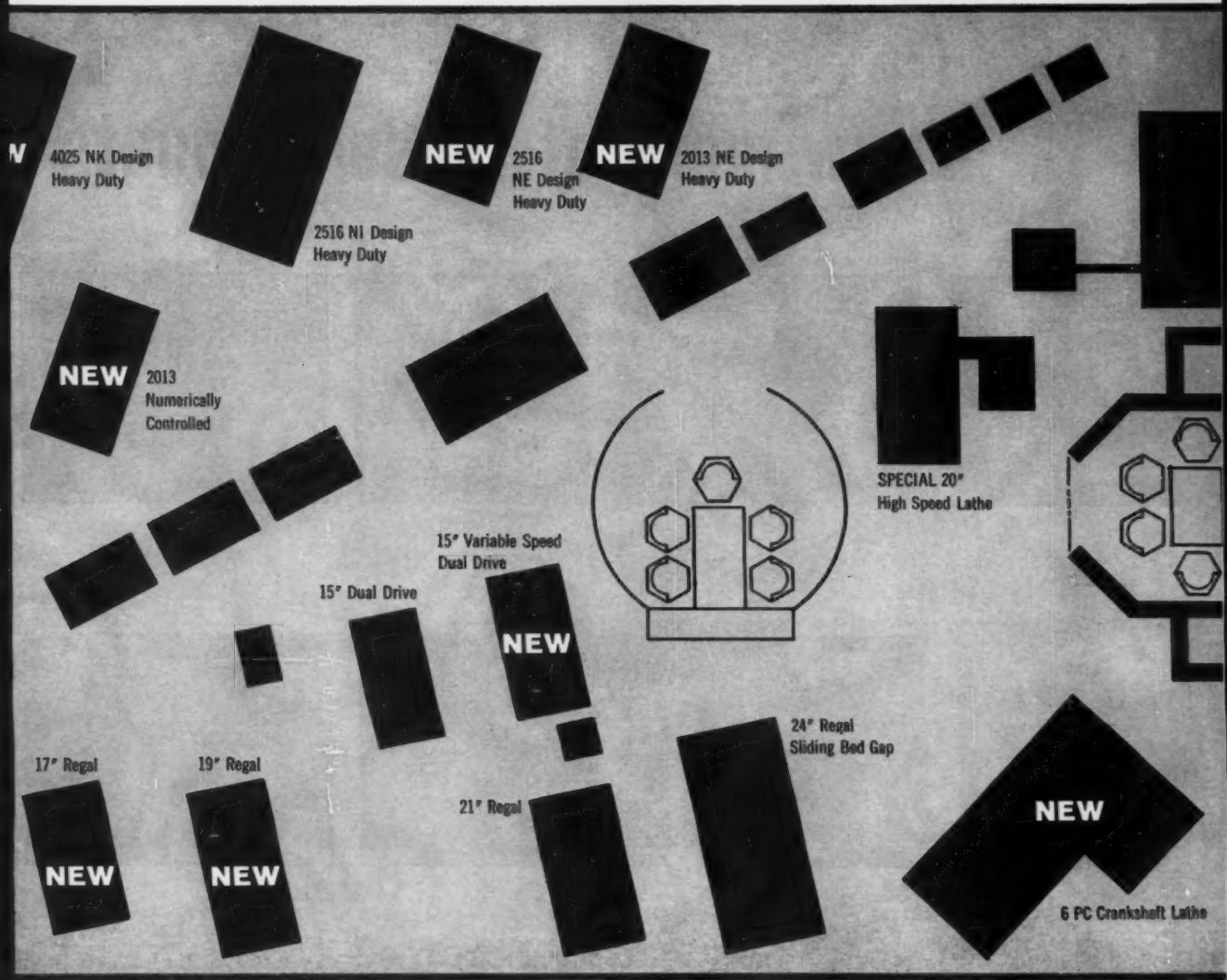
Look to the HEAVY DUTY line for rugged lathes for peak performance and round-the-clock production. The choice of production departments and tooling programs, LeBlond Heavy Duties are made in 6 different series from 13″ to 120″.

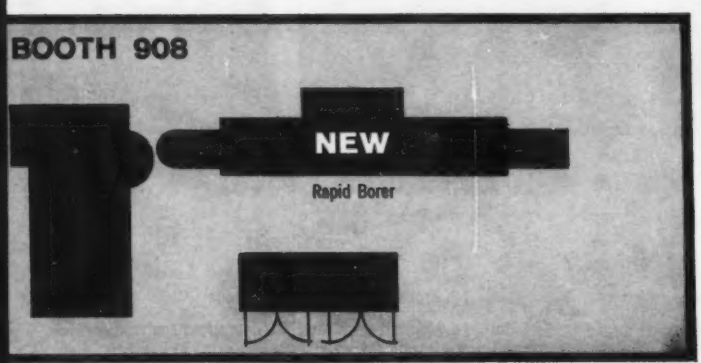
Rely on the RAPID PRODUCTION line for specialized small lathes designed for mass production of specific workpiece categories. Often used with form tooling, they are made in three different models.

LeBlond builds many of these fine lathes in toolroom, plain bed gap, and sliding bed gap models. They may be fitted with a full line of accessories, including *four* different tracers: Regal-Trace, Hydra-Trace, Two-Directional, and 90°, all made by LeBlond.

Sound engineering with ingenuity, three-quarters of a century of experience, a history of notable contributions to better lathe design—these are reason why we say, "With LeBlond, you cut with confidence!"

10 • SEE LEBLOND IN BOOTH 908 • SEE LEBLOND IN BOOTH 810 • SEE LEBLOND





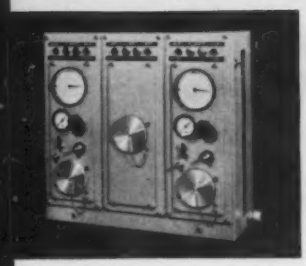
Cut with confidence

LeBLOND of Cincinnati

The R. K. LeBlond Machine Tool Company, Cincinnati 8, Ohio

BOOTH 908 • SEE LEBLOND IN BOOTH 810 • SEE LEBLOND IN BOOTH 908 • SEE L

How many of these products



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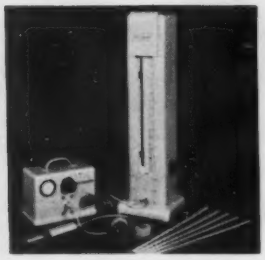

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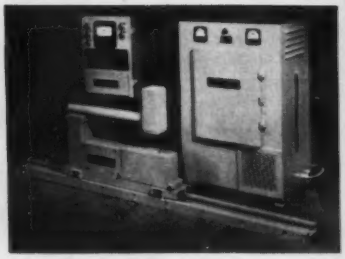

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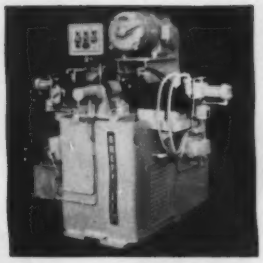

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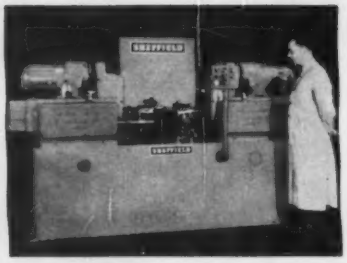

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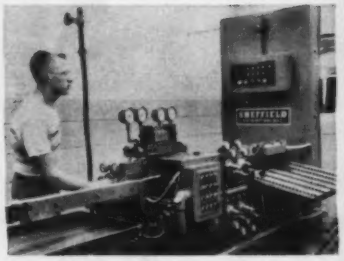

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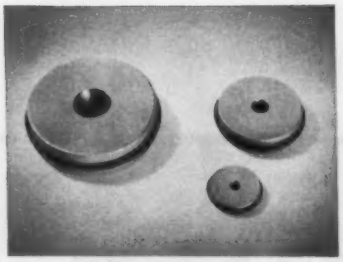

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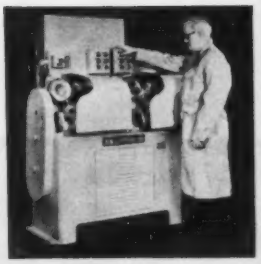

18

1. Pneumatic gage control unit
2. Pneumatic Recorder
3. Precisionaire® gages
4. Measuray® thickness gage
5. Crankshaft gage
6. Multiform grinder
7. Machine control unit
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11. Plunjet airsnap
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13. Automatic bearing assembly machine
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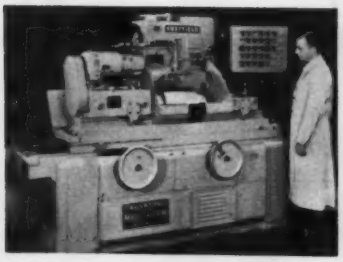
17. Master setting rings, xxx and xxxx
18. Gear chamfering machine
19. Micro-Form grinder
20. Plunjet® gaging cartridges
21. Cavitron® ultrasonic metal working machine

can you identify?

See the whole Sheffield line in action at Booth 201
Machine Tool Show near the main entrance

5



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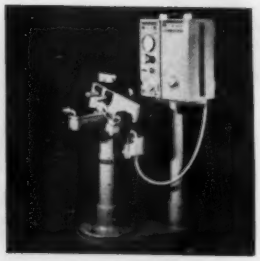

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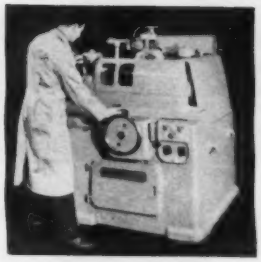

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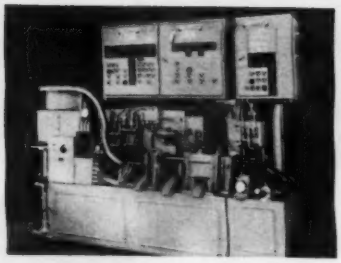

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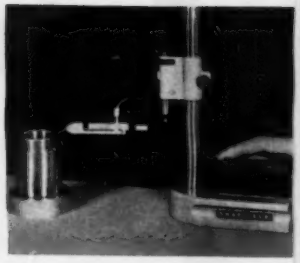

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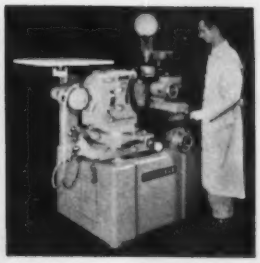

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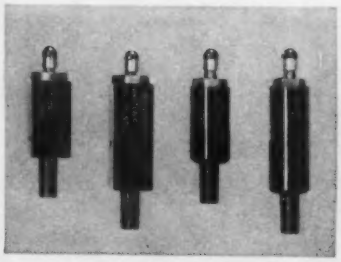

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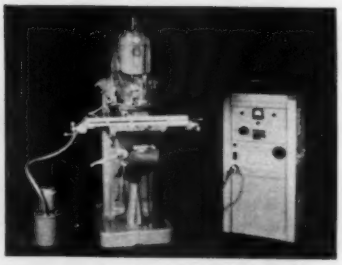


21

Here are some of the many products Sheffield makes. You'll do well to identify even half of those shown. It will pay you to get a copy of Sheffield's condensed catalog No. GC957.

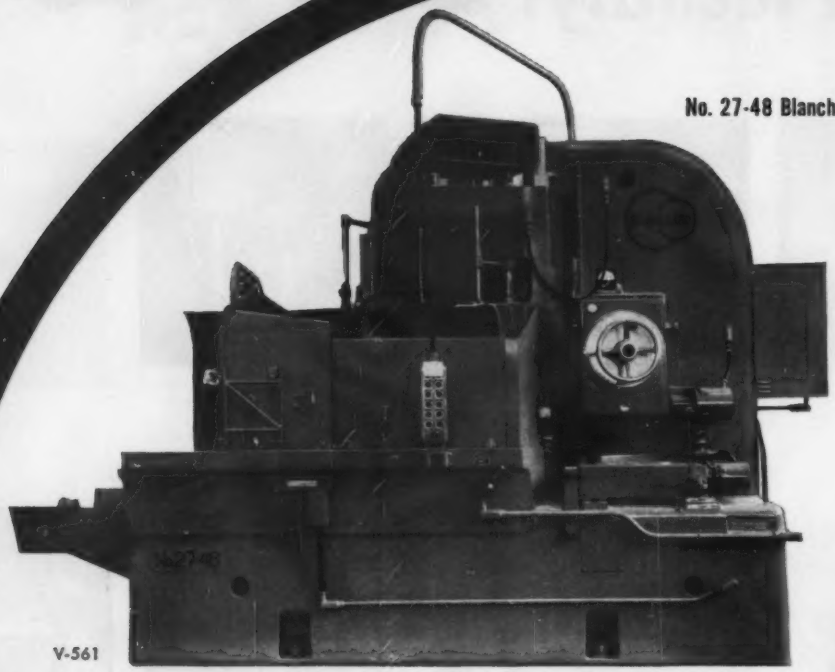
Or for specific product information, circle the number, clip the ad and mail. We'll send the appropriate catalogs.

The
SHEFFIELD
Corporation *Dayton 1, Ohio*

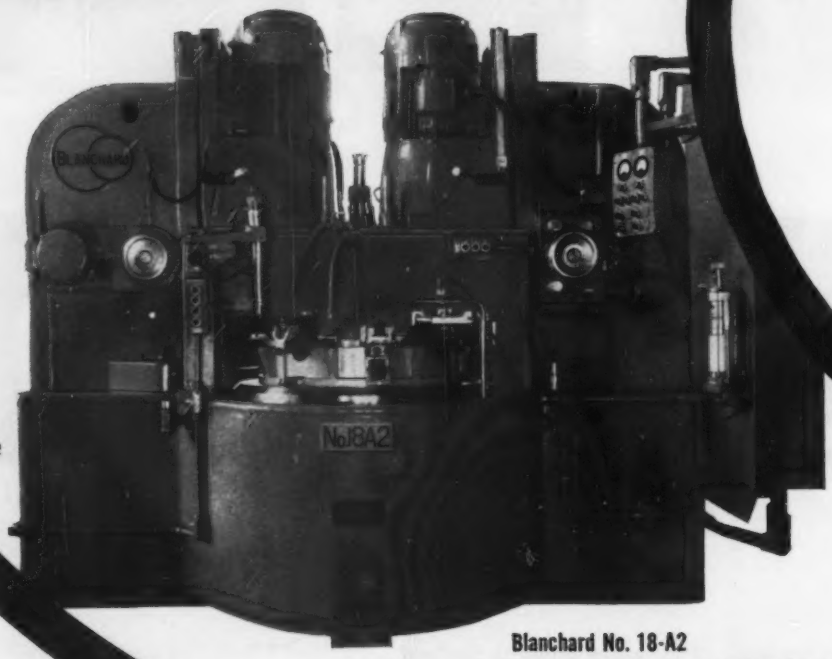
A subsidiary of The Bendix Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

No. 27-48 Blanchard Surface Grinder



V-561



V-562

Blanchard No. 18-A2
Two-Spindle Automatic Surface Grinder

if grinding efficiency is important to you . . .

DON'T MISS SEEING THESE NEW BLANCHARDS AT CHICAGO!

Two entirely new Blanchard Grinders of advanced design will be introduced at the NMTBA Exposition in Chicago. Both machines offer new features and high production capabilities that will interest everyone whose operation requires high-speed, precision grinding.

Booth No. 1209

The No. 27-48 Blanchard Surface Grinder is an entirely new size of Blanchard Grinder. This machine will be equipped with hardened base ways, will be of "dry base" design, and will have a conveyor-type sludge tank mounted at the rear. This machine has a 48″ diameter magnetic chuck with a clearance of 52″ inside of the waterguards, 12″ vertical range and a 27″ segment grinding wheel. This grinder has a 75 HP main spindle motor. Coolant is directed both to the inside and outside of the grinding wheel. These features provide ample power, rigidity and coolant flow for heavy stock removal on a large variety of work pieces. This machine affords great accuracy, extreme flatness and fine finish.

This grinder will be equipped with a motorized Single Cut Device and a floor-mounted control panel.

Other features include: a hand-operated Trabon lubrication system for the spindle bearings, wheel dresser and head ways; automatic Bijur lubricator for the hardened base ways; and oil reservoirs for the table bearing and chuck rotation units.

The No. 18-A2 Blanchard Surface Grinder is a new Two-Spindle Automatic Surface Grinder. This new grinder is of a "dry base" design: in operation all coolant and chips flow to an outside settling tank or central coolant system. The design provides easy access to the grinding wheel area. Push button stations and operator's control are conveniently located for ease of set-up. All controls are interlocked to assure complete safety. A warning light flashes at the operator's station when grinding wheels require replacement. The grinder is equipped with 30 HP foot-type spindle motors.

The grinder has a plain table for mounting of special work-holding fixtures, and a six-speed gear box for table rotation, with provision for locking this in a pre-selected speed. The feed rate in thousandths of an inch per minute can also be locked. The grinder at the Exposition will have an eight-station fixture, each station handling a different work piece to demonstrate the ingenuity of Blanchard fixture design. This table will be rotating to demonstrate clamping and unclamping of the fixtures, and to show the path of the work pieces through the grinding wheels and under the wheel control calipers.

BLANCHARD

The Blanchard Machine Company
64 State Street, Cambridge 39, Mass.

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Select from full lines to operate and control a single OEM product ... or a plant's entire production line!

Schrader means quality ... in complete lines of double-acting and single-acting cylinders in a variety of sizes ... including JIC and miniature cylinders. Schrader Air Cylinders ... as well as complete lines of Valves and Accessories ... are at work on many OEM products and in thousands of plants performing countless jobs. Your Schrader Distributor is fully stocked ... staffed with experts to help you solve any air circuitry problem.

The complete range of sizes and types of air circuitry products is stocked and cataloged by your Schrader distributor. Consult the yellow pages or write Schrader.

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QUALITY AIR CONTROL PRODUCTS

MAXIMUM MACHINE UTILIZATION

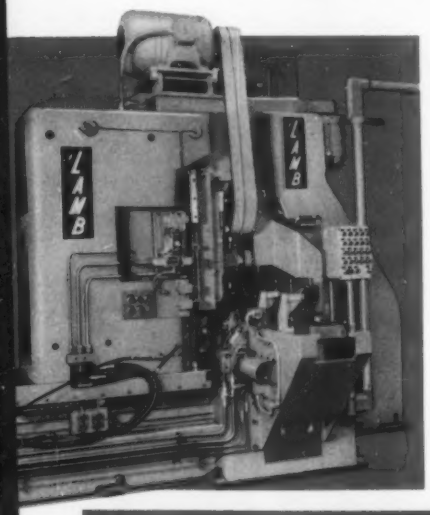
FOR TODAY...
AND TOMORROW

a Design Feature
of all Transfer Machines
that carry this Name Plate

LAMB

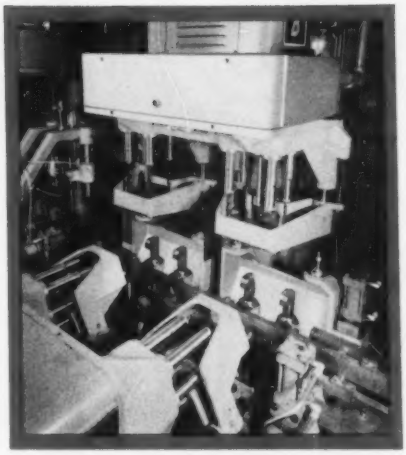
Another LAMB Transfer Machine.

A Few Typical Examples of LAMB'S Maximum Machine Utilization Feature



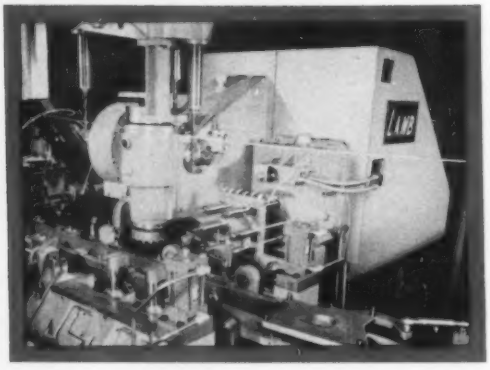
Adjustable Compound Milling Slide

This milling station, although part of the transfer machine, is in itself a standard self-contained milling machine. It can be used to perform a wide variety of milling operations simply by adjusting the controls. In this arrangement the horizontal slide is used for rapid approach and return. The vertical slide feeds the milling cutter across the workpiece.



Single-Slide Double-Station

Here is an outstanding illustration of Maximum Machine Utilization. The vertical and horizontal double-heads perform operations at two stations simultaneously. Each is carried on its own slide and has its own bushing plate. Note the multiplicity of operations performed simultaneously.

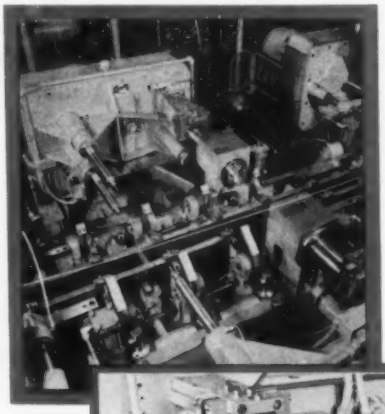


Combination Slide–Milling and Tapping

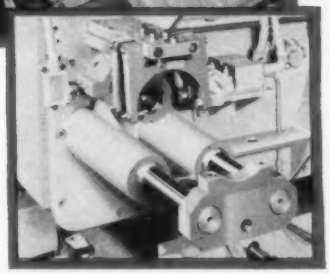
This 2-station, single slide provides two individual feed rates—one for milling, one for tapping. Approach, feed and retract movements of the milling cutter are controlled by the hydraulic power slide while the tapping tools are controlled by a lead screw sliding plate.

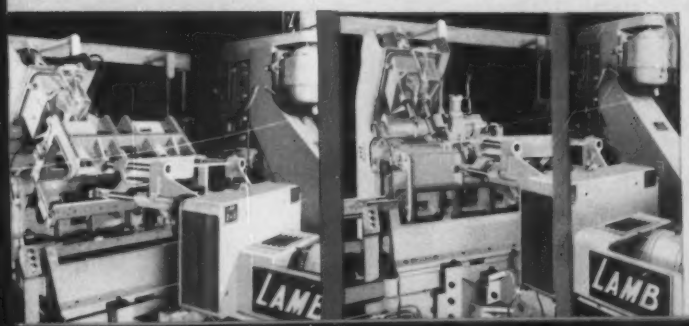
Large Hole Threading With Collapsible Dies

To minimize cycle time, collapsible dies are used to produce internal threads in opposing 4 3/16" diameter holes. The dies are reset automatically. Although this is not a new method of chasing threads in large holes, the dependable, repeatable accuracy built into this operation by Lamb, greatly increased the overall efficiency of the machine.



Closeup photo at lower right shows the study guide bars and support saddle that aid in removing the heavy die assembly when chaser sharpening is necessary.





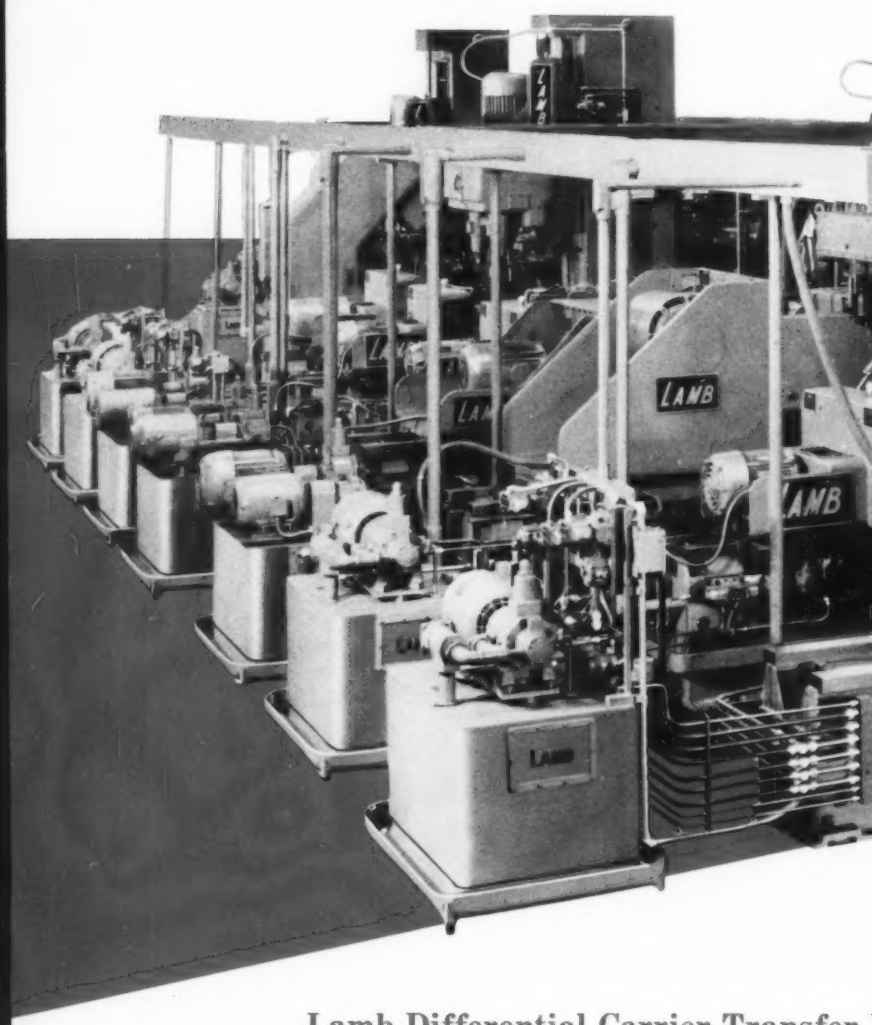
Tilting Fixture Utilized To Eliminate Extra Work Station

To gain access to the bottom flange of the part for drilling angular oil holes, a tilting fixture station is used. Through simple redesign of the fixture and mounting a tapping head at a compatible angle, Lamb eliminated an extra work station saving the cost of an additional main base, fixture and extension of the transfer mechanism.

Designed for Present an

High Produc

Another example of Lamb's thorough understanding of modern manufacturing methods and ability to provide efficient, high production machine tools to do the job is illustrated and described on these pages. The design features of this transfer ma conscious approach at hand as well as t economy including changeover.



Lamb Differential Carrier Transfer

This 34-station in-line transfer machine accommodates two different parts. In the analysis of the parts and the operations to be performed, it was determined that the differential carriers were particularly suited to the 2-station, single-slide machine design. The result is a more compact machine requiring fewer components and represents an overall savings in initial cost, floor space and service maintenance.

There are 72 include: drill (28 (8), spotface (3), (13) holes are cycle produces 1

A push butto out several work machine the seco same for both pa

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machine reflect Lamb's cost-
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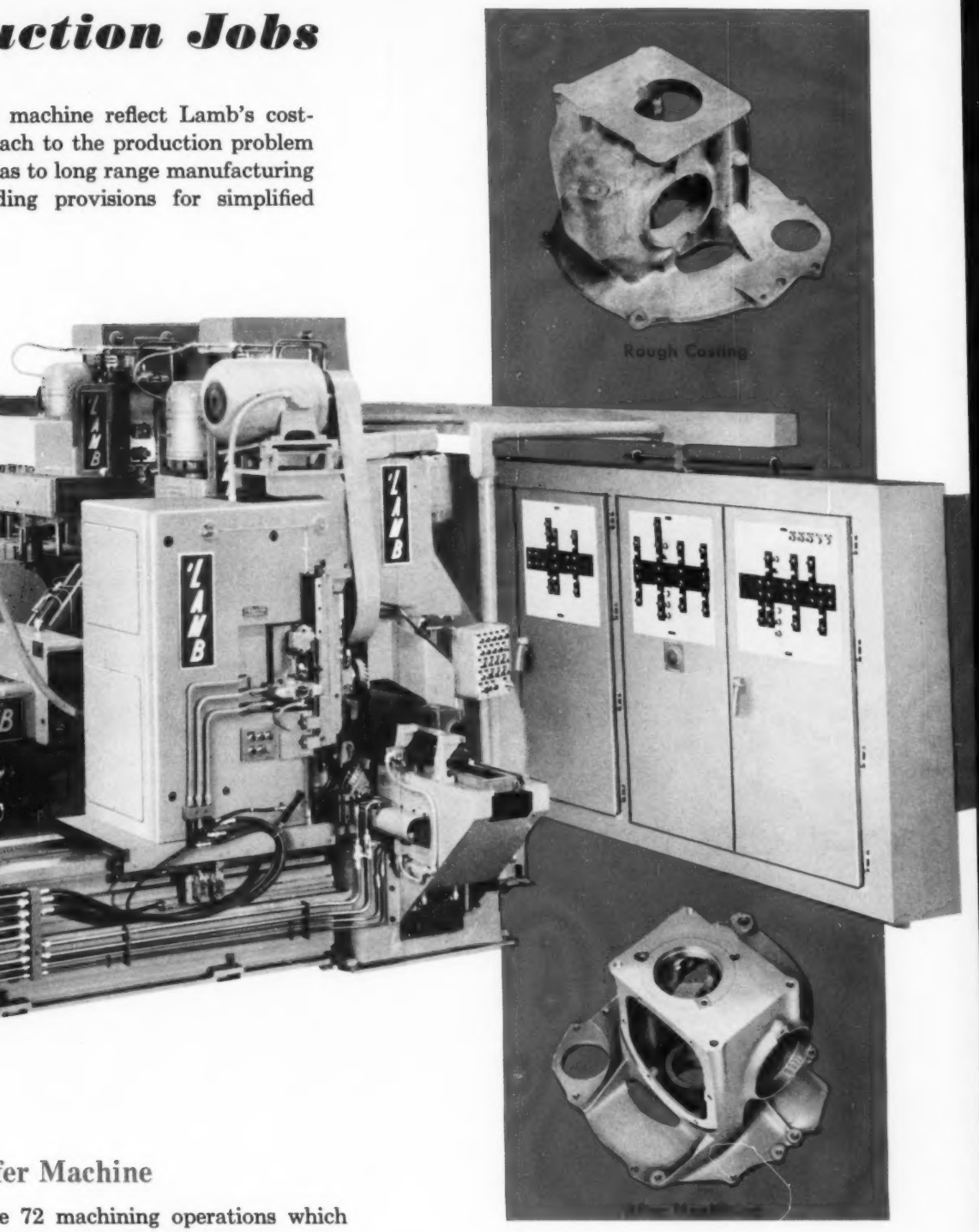


fer Machine

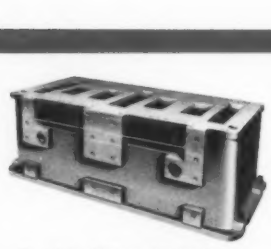
e 72 machining operations which
(28), tap (17), chamfer (13), bore
(3), mill (2), and ream (1). Thirteen
re probed. A 28-second machine
es 128 pcs./hr. at 100% efficiency.
utton at the operator station locks
work units that are not required to
second part. Production rate is the
h parts.

Submit Your Part or Part Prints for Analysis or Suggestions

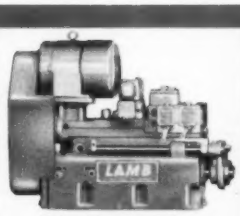
MAXIMUM MACHINE UTILIZATION EXTENDS TO FUTURE PRODUCTION

Include your present Lamb transfer machines in your future production plans. Retooling for new models or part design changes requires little more than new fixtures to suit the new part plus rearrangement of Lamb standard "Building Block" machine components.

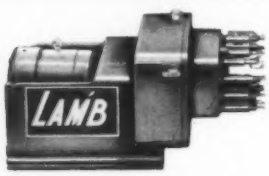
These standard components meet industry's demand for versatility and flexibility in processing equipment. Shown below are several Lamb "Building Blocks" used in the differential carrier transfer machine.



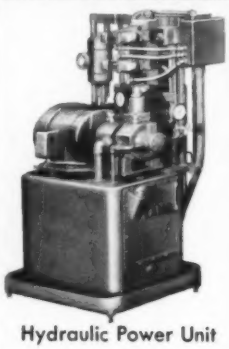
Double Wing Main Base



Quill Type Drilling Unit—Hydraulic



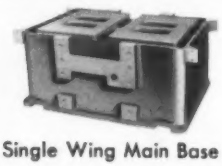
Way Type Drilling Unit



Hydraulic Power Unit

Way Type Wing Base 18" Travel

Way Type Wing Base 24" Travel



Single Wing Main Base

Vertical Column

Probes R
In Secon

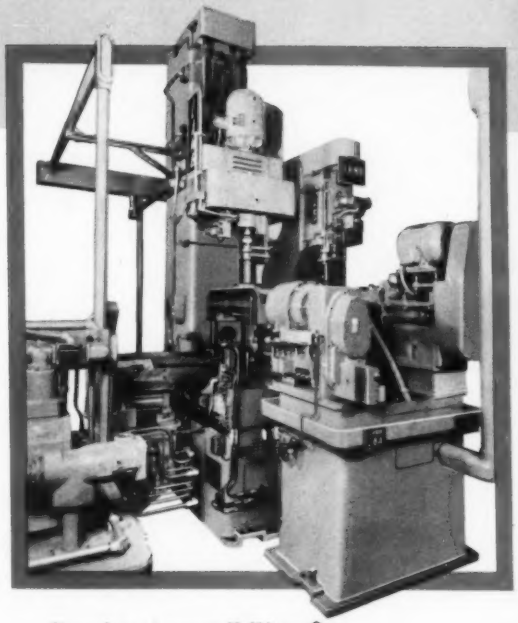
Horizontal
are held
against a
light spring
arrangemer
Simplicity
machines.

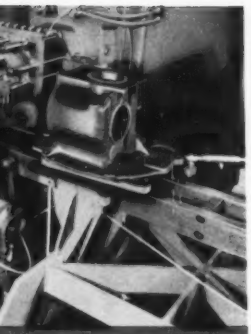
F. JC

Engi

ENGINEERING INGENUITY

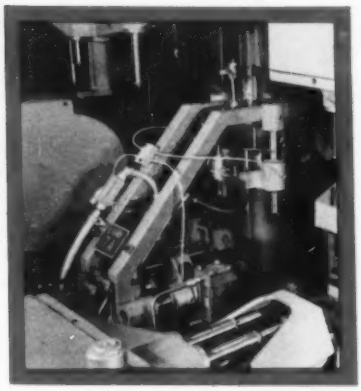
Improves Production Efficiency





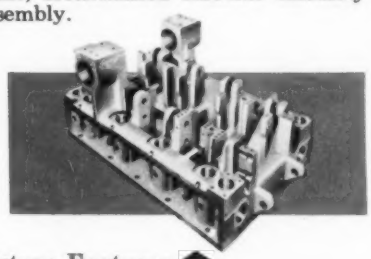
Simple Linkage Repositions Part

A plate, swivel mounted on the transfer bars, carries the part. As the transfer bars move forward the ball type toggle linkage turns the plate and part 90 degrees. Lowering of the walking beam transfer bars places the part on locator buttons in position for the next operation. The plate and linkage are maintenance free. Only occasional greasing of the ball joints is required.



Service Accessibility

Lamb's open-machine design permits easy access to fixtures, tools and all components that require periodic attention. Convenient location and manifold mounting of hydraulic assemblies minimizes downtime. Pipe fittings are grouped for fast, sectionalized machine assembly and disassembly.



es Replaced econds

ontal and vertical probes eld in their bushings t a spacer plate by a pring-loaded bar. Only one limit switch is required with this gement which permits single or multiple hole probing. city of design and ease of maintenance are features of Lamb nes.

Fixture Features

Lamb fixtures are heavy, rigid castings with integral chip sheds. They are precision machined and assembled with quality components that assure accuracy and long, dependable service life. Simple assembly features for EASE OF SERVICE is an important characteristic of Lamb machine fixtures.

The finest in automated materials handling equipment and either special or transfer-type machines are produced in this completely staffed, modern facility.

LITHO IN U. S. A.

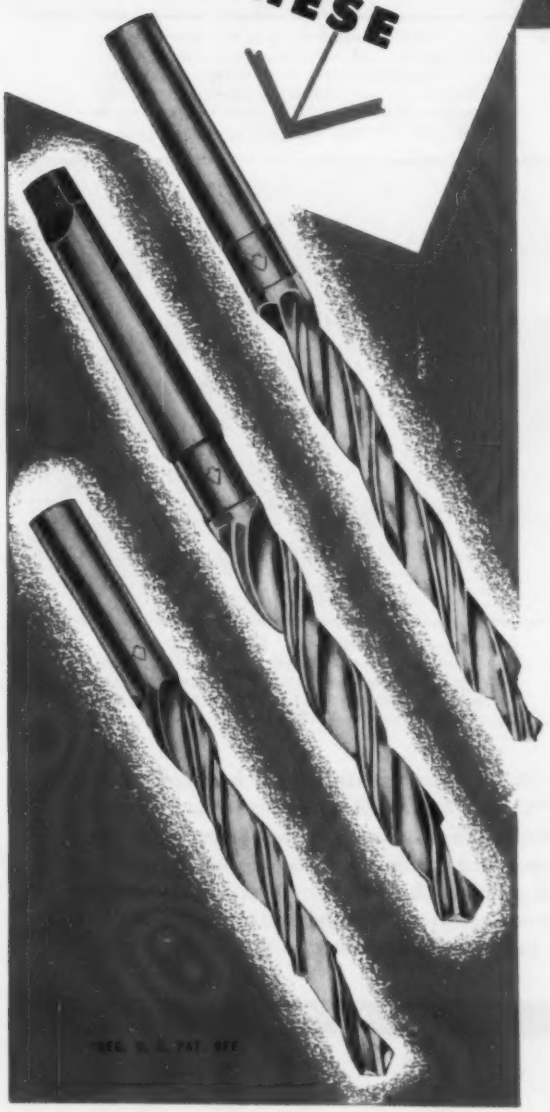
JOS. LAMB CO. SINCE 1914

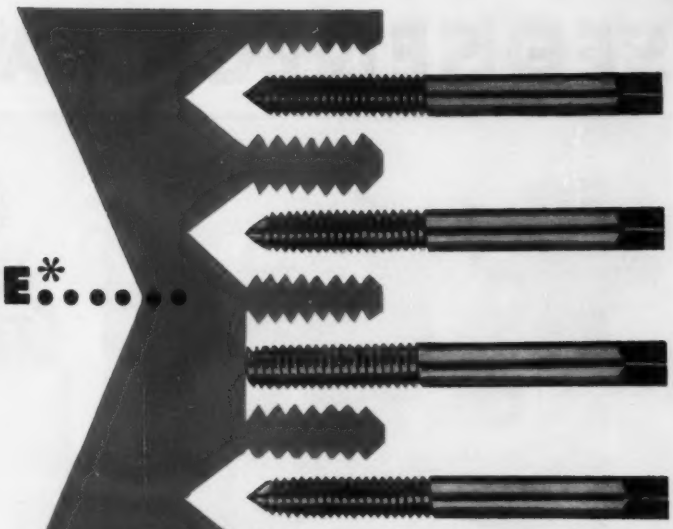
5663 E. NINE MILE ROAD • DETROIT 34, MICHIGAN

ngineers and Builders of Special Machines and Automation Equipment

YOU CAN SAVE MORE OF THESE*.....

BY USING THESE





* Fluteless (non-cutting) taps for cold-forming threads in soft metal such as aluminum, zinc, copper, brass, leaded steels, etc.

MOHAWK STANDARD SUBLAND DRILLS

If you are now using the popular new fluteless (non-cutting) tapping principle for softer metals, you can further improve and simplify your tapping operations through the use of Mohawk Standard Drill-Chamfer sublands. Mohawk drill-chamfer "standards" will simultaneously drill and chamfer clean, concentric holes that will speed your basic tapping operation, eliminate breakage and scrap, reduce your drilling tool inventories, eliminate jig and fixture movement.

If you are interested in drilling tools that really pay for themselves, examine your drilling and tapping costs, then see for yourself how many places a Mohawk "standard" could easily improve the job and reduce your costs.

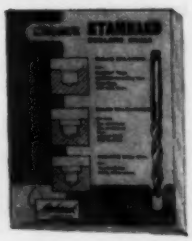
AVAILABLE FROM STOCK—Mohawk "standards" are immediately available in all practical sizes, types and combinations in choice of 3 step lengths and 3 shank styles.

Subland Drill-Chamfer for Regular Taps Fluteless Taps Pipe Taps Heli-Coil® Taps

Subland Drill Counterbore for Socket Head Cap Screws

Subland Drill-Drill for Tap Drill and Body Clearance

Mohawk TOOLS, Inc.
Montpelier, Ohio



WRITE TODAY . . . for your own copy of the big, new catalog of Mohawk Standard Subland Drills.

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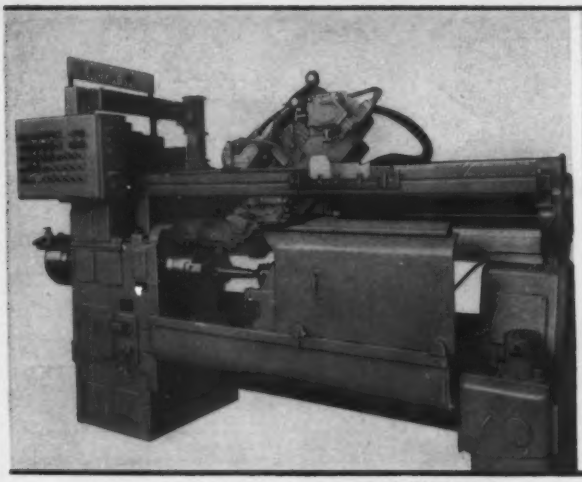


FIG. 1. The 40 H.P. Seneca Falls Model LQ Double-Way Tracer Lathe combines the best and fastest methods of rough and finish turning shafts in one operation. 10½" swing x 26" to 110" (in five increments) between centers.

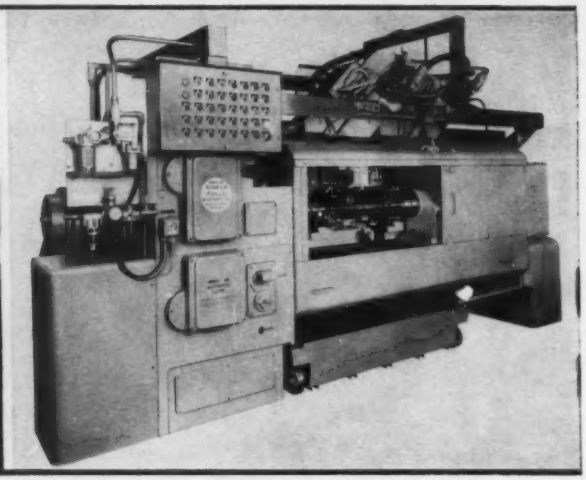


FIG. 2. 60 H.P. Model AQ is a larger version of the Model LQ, offering the same advantages. Rough turning is accomplished with multiple tools or tracer tools on the lower carriages; finish turning with one or more tracer tools on overhead carriage.

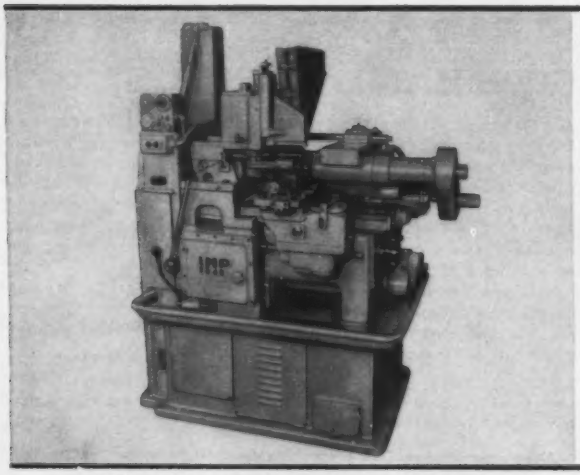


FIG. 5. Model N Cam-operated Lathe is a small Automatic, for work demanding high speeds and extreme accuracy. Machine illustrated is equipped with a rotary type Automatic Loader for pump gears.

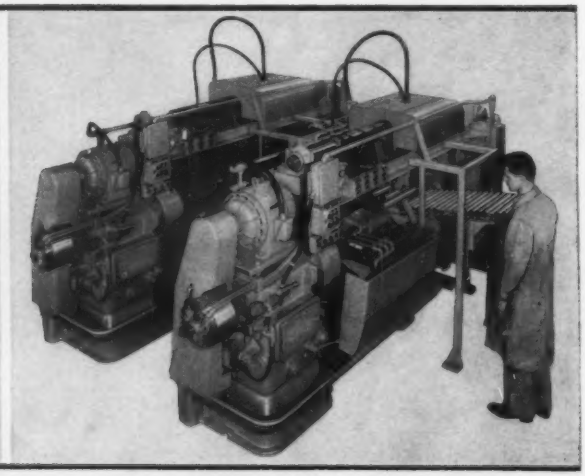


FIG. 6. Two Model LR Automatic Cam-operated Lathes equipped to automatically load, unload, transfer, turn several diameters, face and chamfer both ends of 1½" x 22" electric motor shafts.

SENECA FALLS MACHINE

ENGINEERED FOR PROFIT

You will see several Seneca Falls Machines in operation at our booth, all of them exemplifying the Show's slogan, "Modern Machine Tools = Production Efficiency." You can watch the sensational Model Q Tracer Lathe go thru its paces on typical production work. We will demonstrate the practical advantages of its many distinctive features: how change-over is simplified by a numerical control system; how you can rough and finish turn in one operation by using an indexing tool block; how easy it is to load and unload; how the template is located clear of the chip area;

BOOTH 231

THE MACHINE TOOL SHOW

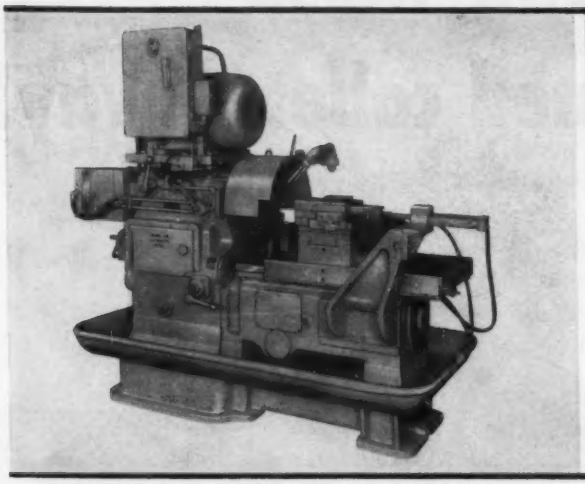


FIG. 3. The Model LN Platen Type Cam-operated Lathe is fully automatic and designed principally as a chucking machine. Ideal for a wide variety of work requiring large swing, high spindle speed; multiple tooling and fast cycling.

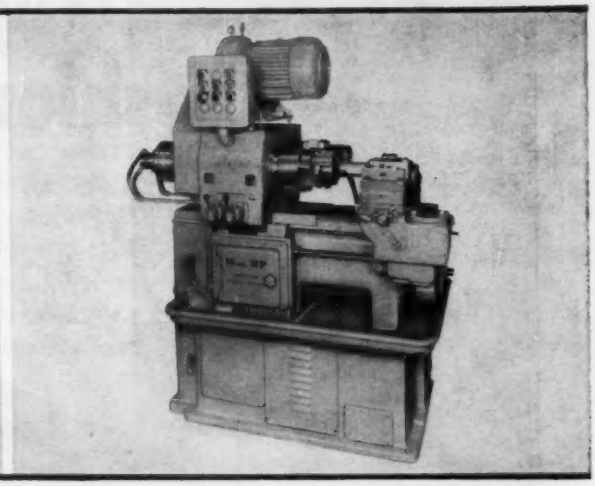


FIG. 4. Model NP is a top quality, reasonably priced Precision Boring Machine made in two types; SINGLE SPINDLE and DOUBLE SPINDLE with unitized heads mounted on a fixed bridge.

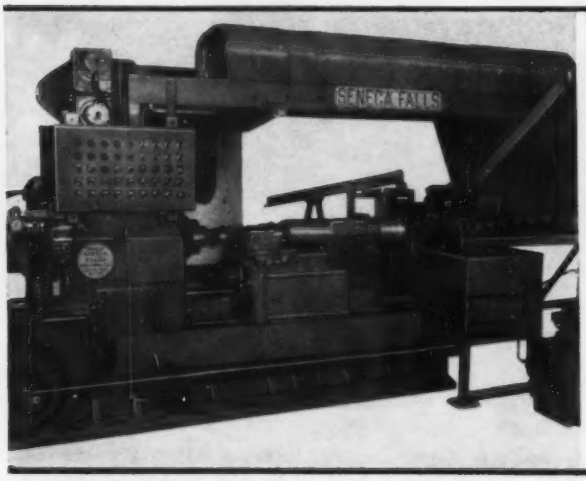


FIG. 7. Model AR Automatic Cam-operated Lathe, equipped with Automatic Loader and Transfer Equipment for handling and machining rear axle stem pinions.

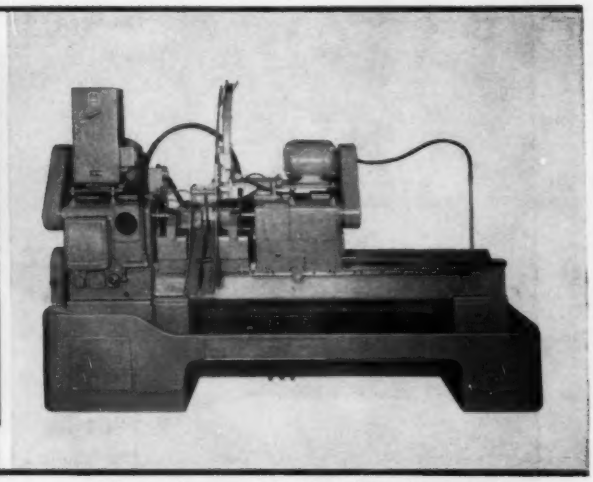


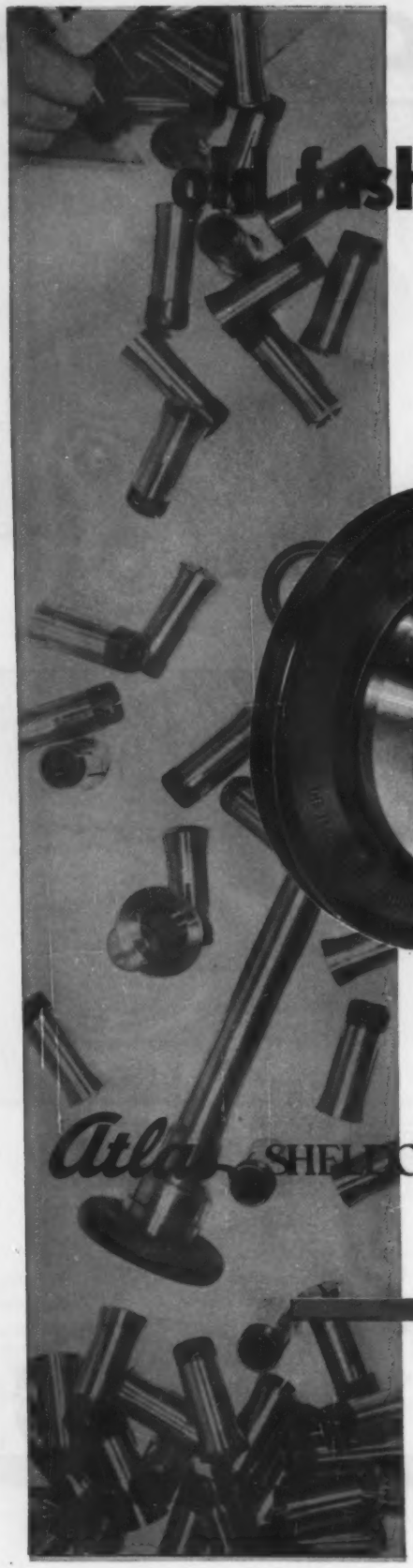
FIG. 8. Seneca Falls Model CS Automatic Drilling and Centering Machine equipped with special Automatic Loader. Operation consists of chamfering both ends of piston pins on a high production basis.

and many other cost and time saving ideas.

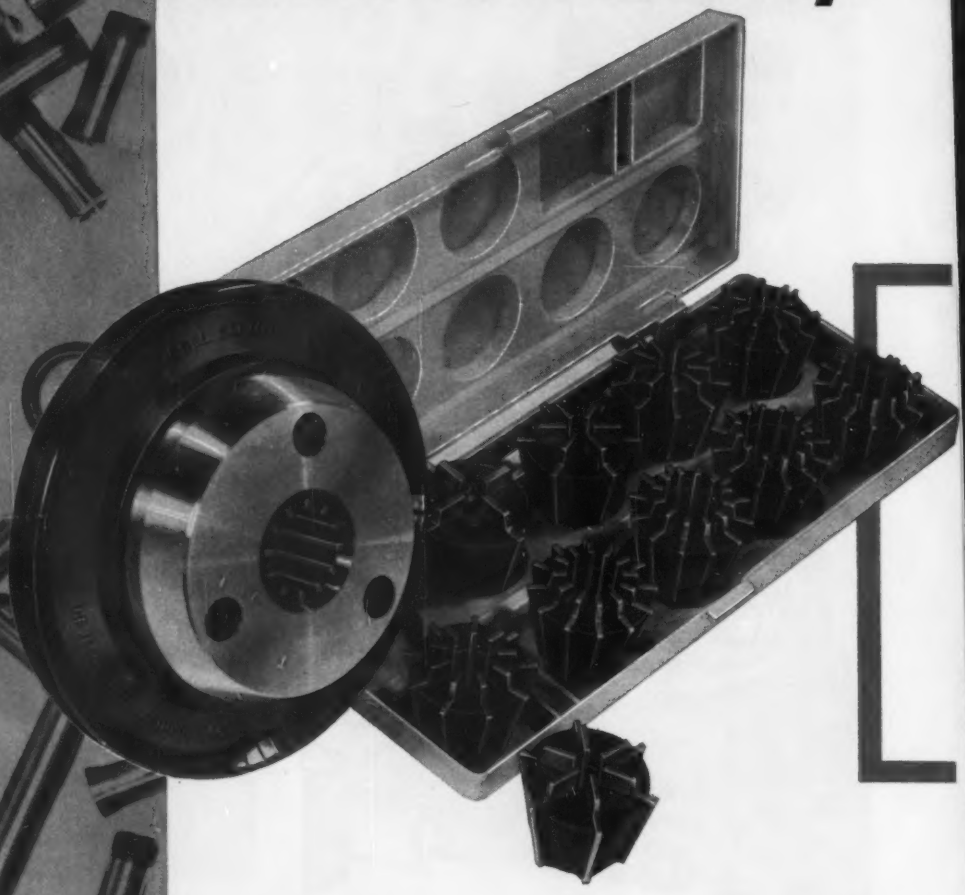
Seneca Falls has been building fine Machine Tools since 1864. Lo-swing Lathes were among the first machines to demonstrate the advantage of multiple tool turning. As pioneers in the field of automation, Seneca Falls engineers have faced just about every work loading, work transfer and machine control problem encountered in the turning and centering field. The benefits of this experience are at your disposal.

MODERN MACHINE TOOLS MMT=PE PRODUCTION EFFICIENCY

MACHINE TOOL EXPOSITION



Throw those old fashioned collets away!



Now you can afford to equip your

Atlas SHELDON DELTA SOUTH BEND Logan

lathes with the world's most modern collet chuck and its Rubber-Flex® Collets

$70.00
Model 50
Collet Chuck

$65.00
Complete Set of
10 Rubber-Flex Collets

You get a lot more for less!

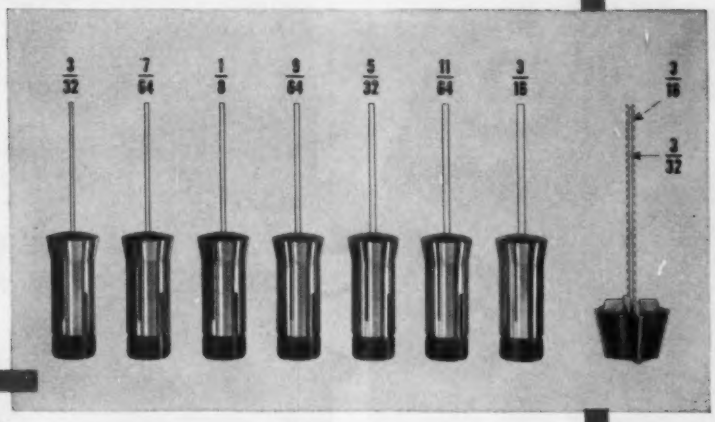
model 50

- is a brand new nose type handwheel chuck
- is quicker to operate
- is easier to operate
- is more accurate
- develops more torque
- increases lathe capacity
- mounts directly onto your spindle
- costs less . . . less . . . less . . .

A lot more for a lot less...

$70.00
for the chuck!

$65.00
for the collets!
($6.50 each)



An entirely new series of ten Jacobs Rubber-Flex Collets has been developed along with the world's most modern collet chuck. Rubber-Flex collets do more because:

- **Jaws are always parallel for greater accuracy . . . maximum runout .001".**
- **Extra long bearing surfaces have stronger grip.**
- **Only 10 collets chuck all bar sizes—3/32" to 1 1/16"—.100" range per collet.**

How one Rubber-Flex collet replaces seven split steel collets

This is the chuck,
these are the collets,
for your . . .

ATLAS • DELTA • LOGAN
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. . . lathes

See your Jacobs industrial supply distributor. Let him prove these fantastic facts with a convincing demonstration at your desk! Call him today.

Jacobs CHUCKS

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For more data circle this page number on card at back of book

EDLUND-MATIC NUMERICAL TAPE CONTROLLED DRILLING & TAPPING MACHINE

The newest Layout Drilling Machine with Numerical Tape or Dial Control. Economically performs multiple operations for Single Piece Layout Work Short Run Production
The entire sequence of operations can be repeated time after time with no chance of operator error—minimizes operator attendance and skill.

FEATURES

- Flexibility in setting up a wide variety of operations.
- Quick conversion from one drilling job to another.
- Work from standard detailed drawings.
- Standard 1" 8 channel punched tape.
- Tape or Dial control.
- Infinitely variable spindle speeds 225-2700 rpm.
- Infinitely variable feeds 1 to 7 inches per minute.
- Nine different operations or tool changes at one setting.
- Foolproof tool rack (available) prevents use of incorrect tool.

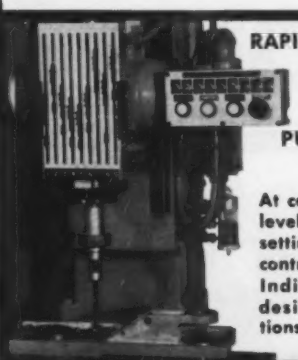
See this new Edlund machine at the National Machine Tool Exposition SPACE 531

* PATENTS PENDING

Write for Bulletin 200.

CONTROL CONSOLE

Operation Selector Switch and Lights for nine operations
Spindle Speed and Feed Setting Knobs and Tachometers.
Table Positioning Dials for two axiis.
Zero Offset Dials.



RAPID ADVANCE AND FEED STOPS PLUS PENDANT PUSH BUTTON STATION

At convenient eye level for precision setting and easy control.
Indicator Lights designate operations.

EDLUND COMPOUND TABLE

A new concept in extremely rapid positioning table. Many exceptional features. Table Travel 14" x 20". 200"/per min.

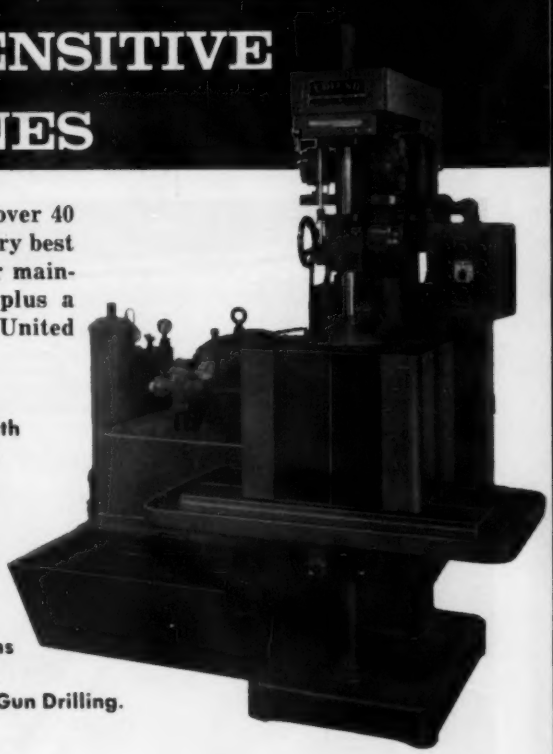
Special Contract Job work can also be arranged with Edlund. Send Part, Blueprint and Requirements.

EDLUND
MACHINERY COMPANY
Cortland, New York Division of Harrop Corporation

EDLUND REPRESENTATIVES IN MAJOR CITIES

EDLUND GUN DRILLING PRODUCTION & SENSITIVE DRILLING MACHINES

Edlund's complete line of Drilling Machines backed by over 40 years of specialized drilling experience assures you the very best in engineering and construction. Edlund's reputation for maintained accuracy without downtime over long periods plus a capable dealer service organization throughout the entire United States has the answer to your drilling requirements.



EDLUND MODEL 2G
Gun Drilling Machine with Edlund Model 2HPC High Pressure Coolant System
The most efficient unit for producing accurate and smooth holes at production rates.
Capacity ⅝" in steel.
For complete specifications write for Bulletin 2GR
FREE! Special Report on Gun Drilling.

EDLUND MODEL 2F HEAVY DUTY DRILLING AND TAPPING MACHINE
Infinitely Variable Spindle Speeds available in spindle combinations from 1 to 8 with 8", 12" or 15" overhang.
Capacity 1" in cast iron.
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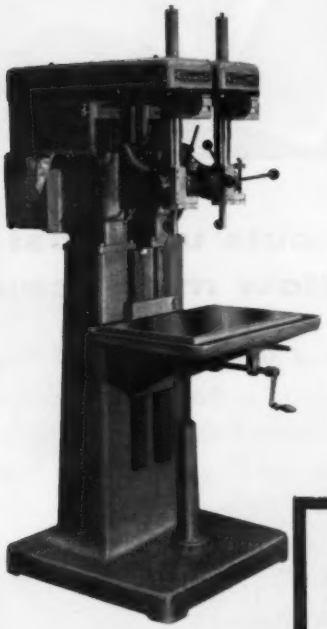
Also EXTRA HEAVY DUTY MODEL 4F,
Capacity in cast iron to 1¼".
1 to 4 spindles, 12" overhang.
Write for Bulletin 170R.



EDLUND MODEL 1F
High Speed Sensitive Drilling Machine for small parts and light assemblies.
1 to 6 spindles, 7" and 10" overhang.
Capacity in cast iron to ¾".
Speeds to 10,000 RPM.
Pedestal or Bench types.
Write for Bulletin 160R.

Also MODEL 1½F
1 to 6 spindles, 7" and 12" overhang.
Capacity to ⅝" in cast iron.
Speeds to 6,000 RPM.
Write for Bulletin 165.

SPECIAL MODELS ENGINEERED TO ORDER. You can call upon Edlund to design special application machines for you. Edlund Cam Feed Units are readily adaptable to specialized drilling operations. Specifications and quotation submitted promptly on request.

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In one midwest plant, total cost of deburring 20,000 complex aircraft parts by barrel method came to less than $200. This compares with a former cost of $3,000 by hand methods.

This startling reduction in cost is the result of handling hundreds of pieces at a time, instead of grinding each one separately . . . and the result, too, of using the right compound to help the media and barrel do their work.

It's in selecting and supplying the right compound that Oakite helps you get the most out of barrel finishing. Oakite compounds include alkaline and acidic types . . . for steel, brass, zinc die castings, aluminum or alloy parts.

Ask your local Oakite man about barrel finishing, or write for free booklet on barrel finishing to Oakite Products, Inc., 26 Rector Street, New York 6, N. Y.

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NEW!

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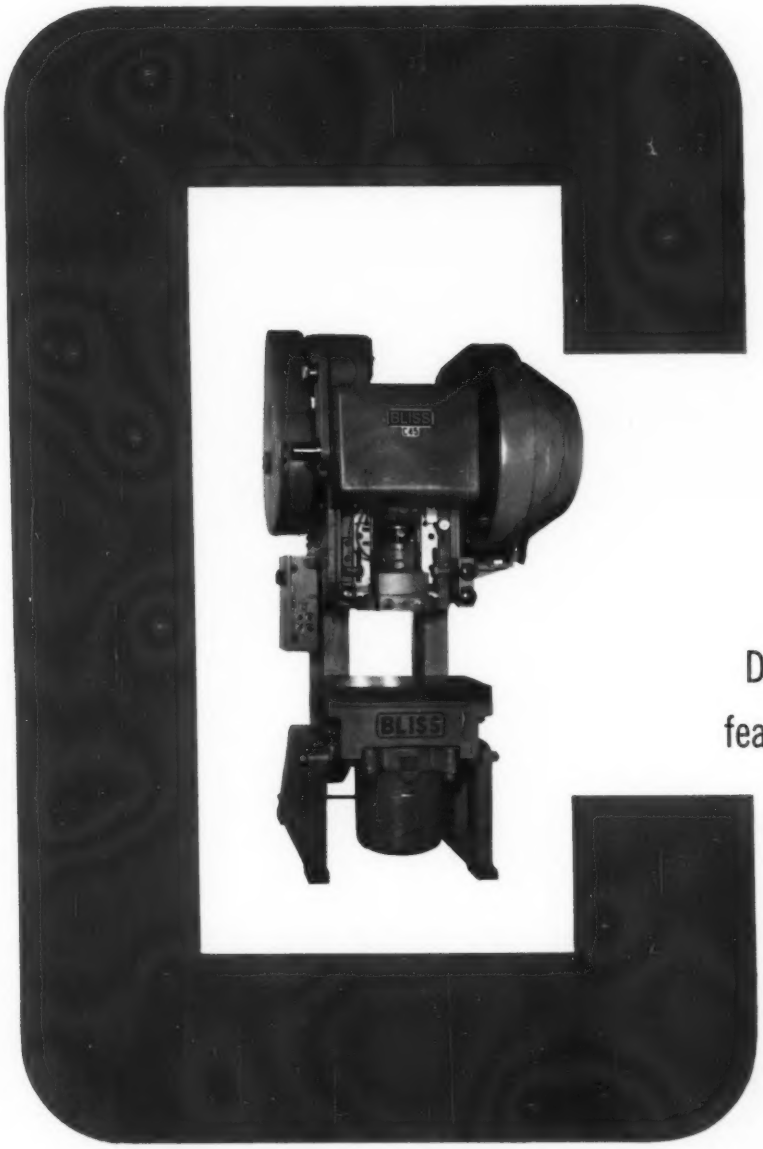
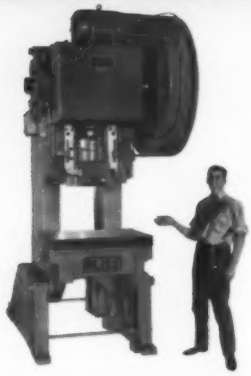


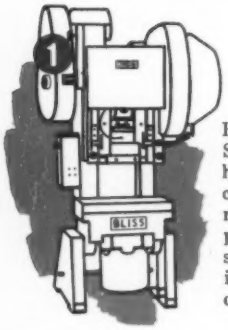
Dollar for dollar...
feature for feature...
the
finest
inclinable you
can buy

to learn why, simply turn the page.

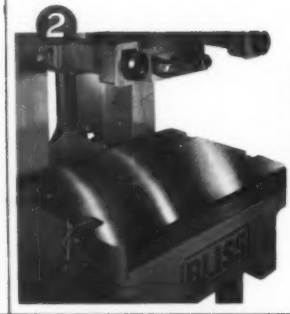


New Bliss "C" Series:

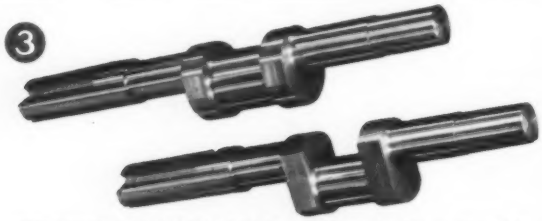
more press, dollar for dollar, than any inclinable ever designed



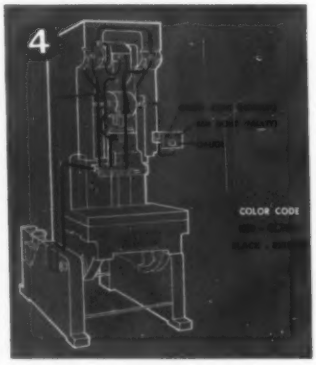
RUGGED NEW FRAME . . . Sturdiest ever in Bliss' inclinable history. Deflection and vibration are cut to a minimum, providing maximum die life and uniformity of parts. Every working part has strength to match, so that each "C" inclinable develops tonnages in excess of JIC specifications.



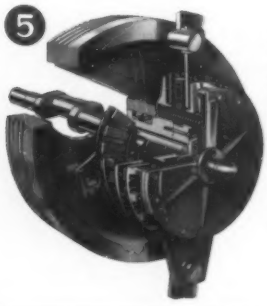
MORE DIE SPACE THAN EVER BEFORE . . . Lengthened slide adjustment and larger openings in the bed and between the uprights provide the roomiest die area ever offered in a Bliss inclinable.



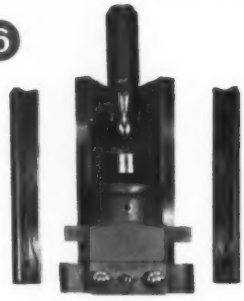
HEAVIER CRANKSHAFT . . . Crankshafts on the "C" series (top) are large, having as much as 25% to 30% greater diameter at the crankpin. Precision-forged from SAE 1045 steel, all "C" series crankshafts are normalized to withstand shock under load, then machined and finish-ground to a tolerance of ±0.002".



RECIRCULATING OIL LUBRICATION . . . You can specify a fully automatic recirculating system on your new "C" inclinable. If you prefer, your press can be supplied with a reliable "Bijur" system, or job-proven Bliss manual system which is supplied as "standard" equipment.



CHOICE OF CLUTCHES . . . Bliss Type CK Combination Air Friction Clutch and Brake, which has proven its single-tripping ability, or the Bliss Rolling Key Clutch, the most dependable positive clutch ever developed for power presses.



BALL-TYPE CONNECTION LAMINATED BRONZE GIBS . . . Every "C" inclinable has the famous Bliss ball-type connection screw, proved in thousands of plants. Laminated bronze gibs provide maximum resistance to wear, prolong service life.

Learn more about the clean, modern looking Bliss "C" series inclinable presses. Our just-published brochure gives all the specifications. Send for it today.

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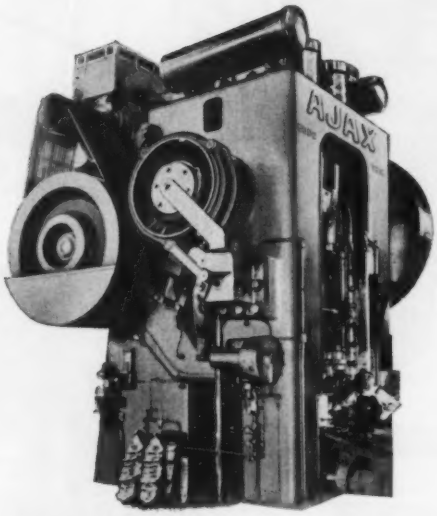
the Ajax line

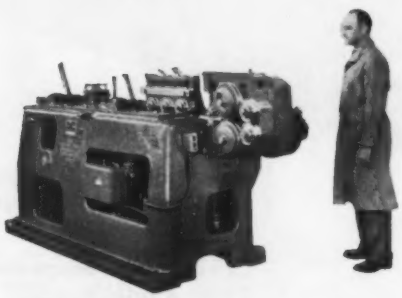
OF METAL WORKING MACHINES



"HIGH SPEED" FORGING PRESSES

Built in 13 sizes from 300 to 8000 tons capacity. Ajax Presses are built with massive, solid, mill housing-type steel frames. Rigid frames assure excellent alignment and accurate die match for the production of uniform and accurate forged parts.

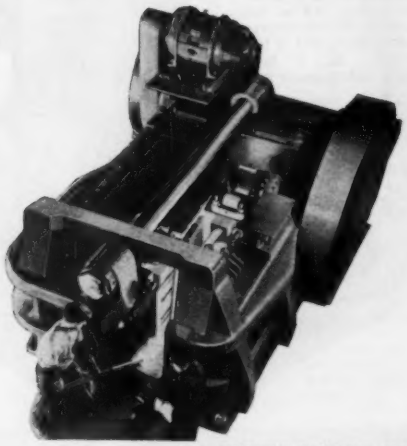
Write for Bulletin 75-C



AJAX-HOGUE WIRE DRAWERS

An attachment for any size cold header and parts former. It cold draws wire in a straight line from hot-rolled stock instead of cold-drawn wire. You save the difference in cost of material and at the same time produce the highest quality cold-headed parts.

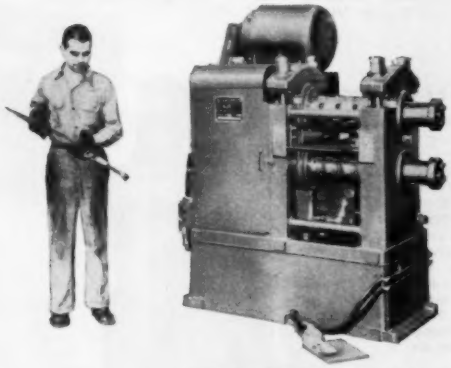
Write for Bulletin 111-B



"AIR CLUTCH" FORGING MACHINES

Choose from a complete line of forging machines—Sizes 1" to 12" to make the forged parts you need . . . Transmission gears —Flanged axle shafts—Crankshaft flanges—Jet Blade Blanks—Implement & Tractor forgings. There's an Ajax Forging Machine for every field of upset forging in industry.

Write for Bulletin 65-D



"WIDE ADJUSTMENT" FORGING ROLLS

Pre-roll your forging blanks for metal saving—longer die life—and better fibre flow. Ajax Rolls are available in 7 sizes to pre-roll forging blanks ranging from connecting rod blanks to the largest propellers. Extension shafts with overhanging dies permit rolling long work.

Write for Bulletin 91-B

SERVING THE FORGING INDUSTRY SINCE 1875

THE Ajax MANUFACTURING COMPANY

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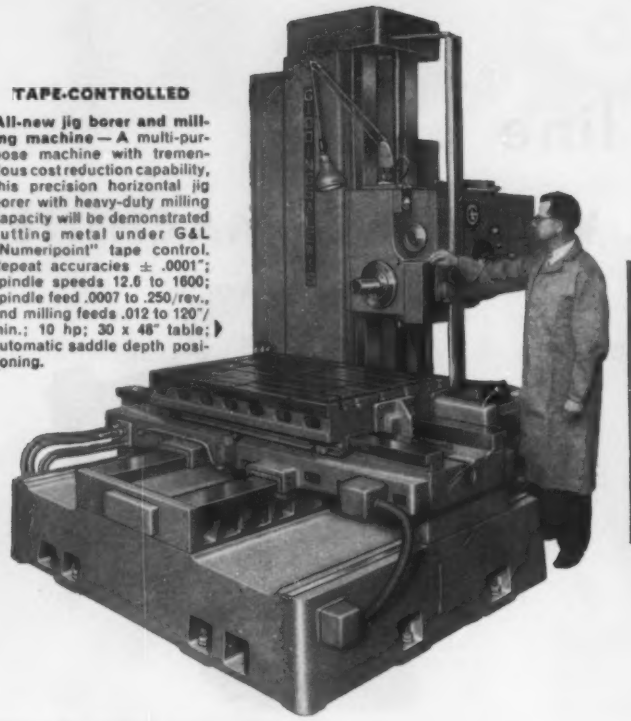
For more data circle this page number on card at back of book

MMT=PE

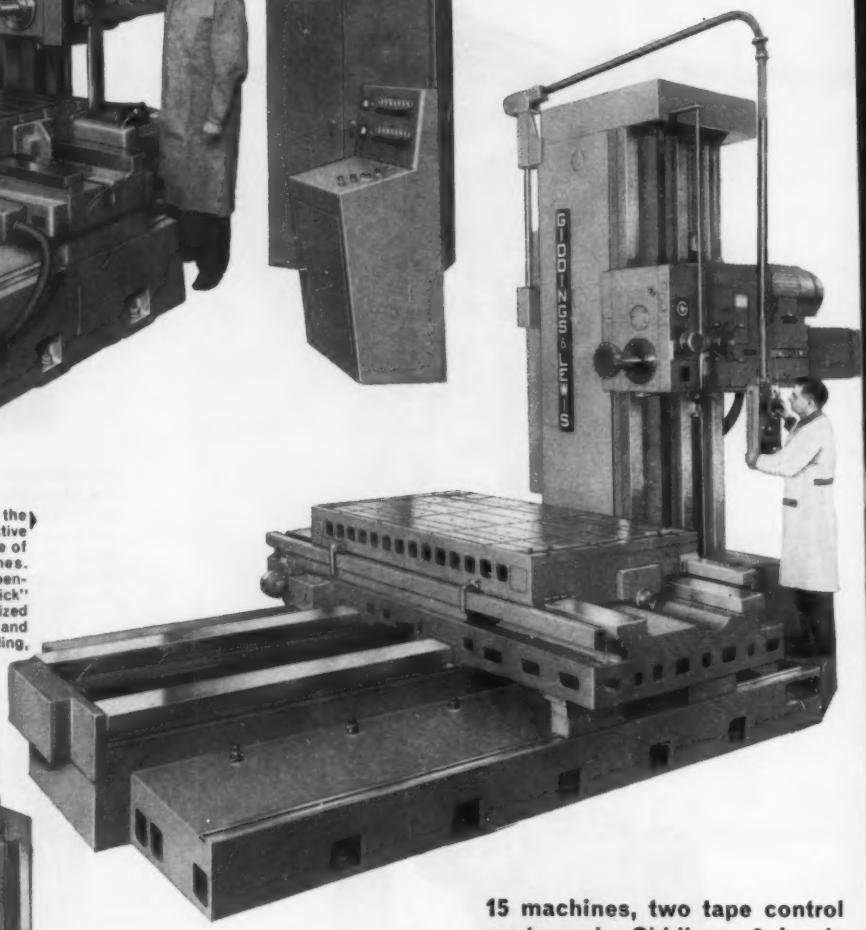
TAPE-CONTROLLED

All-new jig borer and milling machine — A multi-purpose machine with tremendous cost reduction capability, this precision horizontal jig borer with heavy-duty milling capacity will be demonstrated cutting metal under G&L "Numeripoint" tape control. Repeat accuracies ± .0001"; spindle speeds 12.6 to 1600; spindle feed .0007 to .250/rev., and milling feeds .012 to 120"/min.; 10 hp; 30 x 48" table; automatic saddle depth positioning.



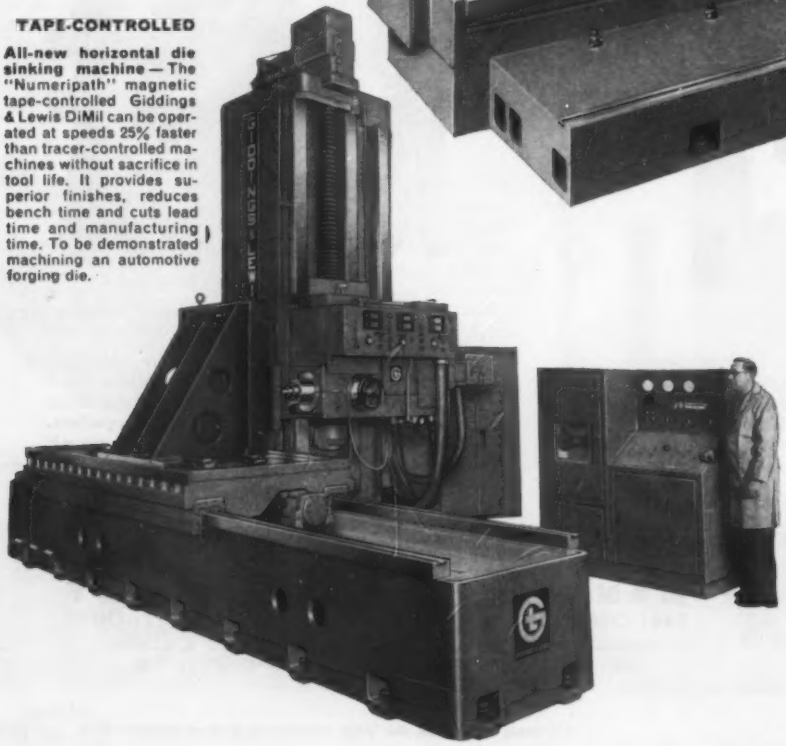
TAPE-CONTROLLED

All-new table-type horizontal built with the power and rigidity to make it the most productive machine in the history of the world's leading line of horizontal boring, drilling, and milling machines. Dozens of advanced features include complete pendant control of every machine function, "joy-stick" control of milling feeds, 3-way column, motorized headstock, independent and combination saddle and spindle feeds. To be demonstrated boring, drilling, and milling under "Numeripoint" control.



TAPE-CONTROLLED

All-new horizontal die sinking machine — The "Numeripath" magnetic tape-controlled Giddings & Lewis DiMil can be operated at speeds 25% faster than tracer-controlled machines without sacrifice in tool life. It provides superior finishes, reduces bench time and cuts lead time and manufacturing time. To be demonstrated machining an automotive forging die.



15 machines, two tape control systems in Giddings & Lewis $1,000,000 display

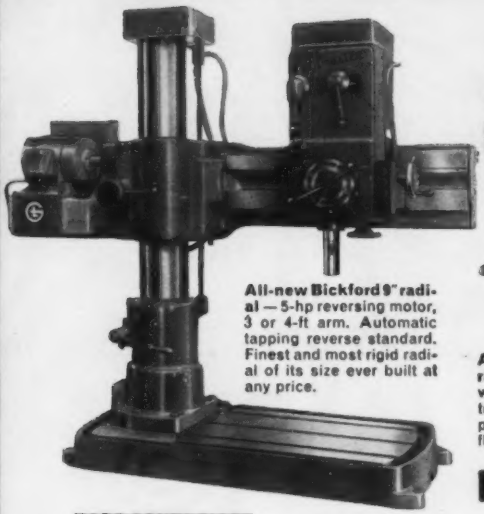
15 advanced design machine tools with a total worth of more than $1,000,000 will be exhibited by Giddings & Lewis at the Machine Tool Exposition. All machines will be under power, five operated by G&L "Numeripoint" punched paper tape control, and one under G&L "Numeripath" magnetic tape path control. 12 machines will be cutting metal.

The capabilities of this equipment as compared to that built just a few years ago are almost unbelievable. Make a note now to see them in action!

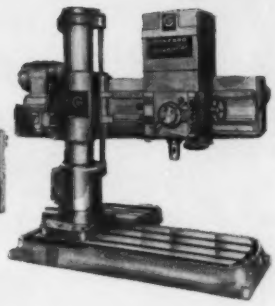
Ad No. GL-100

"Numeripoint," "Numeripath," and "DiMil" are Giddings & Lewis trade-marks.

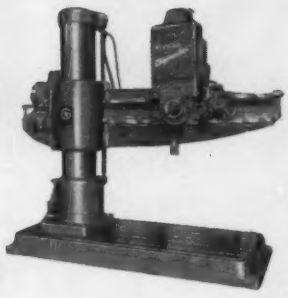
AT BOOTH NO. 1320!



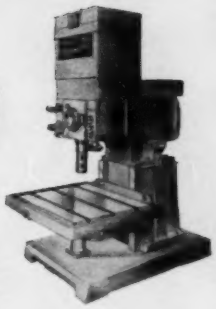
All-new Bickford 9" radial — 5-hp reversing motor, 3 or 4-ft arm. Automatic tapping reverse standard. Finest and most rigid radial of its size ever built at any price.



All-new 10-hp 11" Bickford radial — New heavy-duty head with pushbutton spindle control enables the operator to put more finished parts on floor.



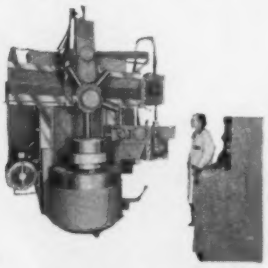
Heavy-duty 15" and 19" Bickford radials — The exclusive capabilities of these machines will be demonstrated by tapping Class 3 threads, drilling 3" holes at .100" feed/rpm!



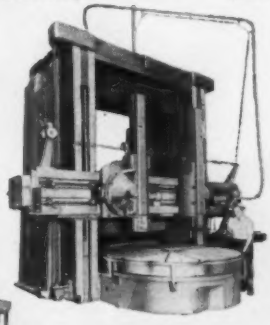
All-new Bickford 30" upright drill —This versatile 10-hp machine is a totally new concept in fast precision equipment for production and layout drilling. Features pushbutton operation.

TAPE-CONTROLLED

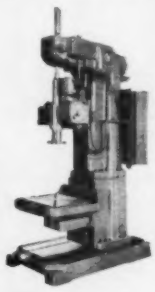
42" vertical turret lathe — An original G&L development that brings revolutionary economies to automatic small-lot machining. Table speeds, feeds, the five tools in turret head and four in side head are positioned by tape.



8-ft heavy-duty vertical boring mill— with full pendant control, roller bearing table track, and electronic readout measuring system. Operates continuously at carbide and ceramic tool speeds without loss of accuracy.

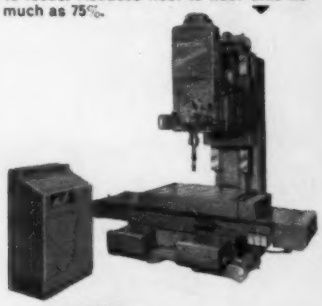


New 28" Bickford automatic cycling drill — A wide range of speeds and feeds in combination with automatic cycling and pushbutton control make this machine an outstanding producer on small lots or long runs.



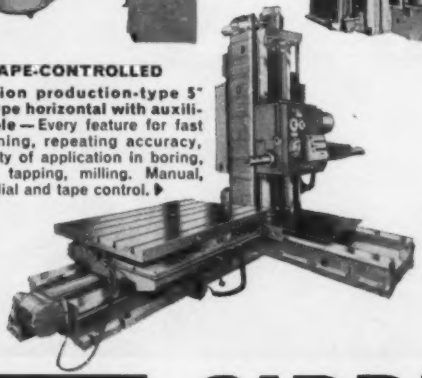
TAPE-CONTROLLED

New high-speed positioning table and precision drilling machine — 360"/min 38" x 50" table with 5-ton capacity positions to ± .001", repeats to ± .0005". Drill features full preselection of 36 speeds, 18 feeds. Reduces floor-to-floor time as much as 75%.

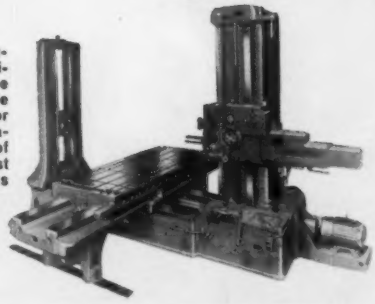


TAPE-CONTROLLED

Precision production-type 5" floor-type horizontal with auxiliary table — Every feature for fast positioning, repeating accuracy, versatility of application in boring, drilling, tapping, milling. Manual, digital dial and tape control.



A new simplified manufacturing-type 4" horizontal featuring exclusive new zero positioning scale and many other items for operating ease and versatility that make it one of the fastest and easiest machines to run that has ever been built.



GIDDINGS & LEWIS

GIDDINGS & LEWIS MACHINE TOOL COMPANY, Fond du Lac, Wis.

Jig borer and milling machines; horizontal boring, drilling, and milling machines; vertical turret lathes; vertical boring mills; positioning tables; die sinking machines; contour milling machines; radial and upright drilling machines; planers; planer mills; numerical and tracer control systems; Davis boring tools.

Guaranteed accuracy of positioning, 75 millionths of an inch

Precision and reliable performance are two important reasons why SIP Hydroptic Machines are first choice of leading manufacturers in the metalworking industry.

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- Export-Import Future Studied
- 1959 Machine Tool Output Summarized
- Overseas Machinery Trend Noted

Keeping up with Washington

Loring F. Overman

Tariff rules under which machine tools and other machinery—among thousands of other items—will be shipped to and from many parts of the world are to be drafted in Geneva, Switzerland, during conferences beginning in September. At that time the United States will participate in multilateral tariff negotiations within the framework of the General Agreements on Tariffs and Trade (GATT).

Since early in May, several Washington groups have been busy preparing for the Geneva negotiations. Conferences have involved the State Department, Business and Defense Services Administration, Tariff Commission, and representatives of industries affected.

Climaxing the preparations, public hearings began July 11 for the purpose of completing briefs upon which the Interdepartmental Committee on Trade Agreements will conduct negotiations. First of the Geneva sessions will be concerned principally with review and possible extension or modification of existing international tariff schedules. Preparations for this phase include publication of a long list of imported items, including machine tools, on which the United States has granted tariff concessions.

During the second phase of the conference, scheduled to begin in January, 1961, parties to the tariff agreements will negotiate for an exchange of new concessions. In publishing a fifty-page list of items on which the United States delegation will seek concessions for United States exporters, nine pages are devoted to industrial machines. Included are nonportable metal-cutting machine tools and parts (lathes, boring machines, tapping and threading machines, and milling machines; gear cutting machines and drilling machines; planers, shapers, and slotters; grinding machines, sawing machines, and other metal-cutting tools and parts for machine tools).

The list of metal-forming machine tools, parts, and accessories includes metalworking presses; bending, roll-forming, punching, and shearing machines. Metalworking machines and parts listed include rolling mill machinery and parts; metal-finishing machines and parts; foundry equipment; pneumatic portable tools; gas welding machinery; and other metalworking machines, parts, and accessories.

In publishing the lists, the Interdepartmental Committee on Trade Agreements observes:

"There is, of course, no certainty that concessions can be obtained for any particular commodity. The possibility of obtaining such concessions will depend in part on the extent to which the product in question is supplied or may be supplied . . . by the United States to the country concerned, the willingness of the other country to modify its tariff provisions, and the abilities of the United States to reciprocate."

Details of the negotiations and the lists proposed for consideration are available from the Government Printing Office, Washington 25, D. C.

1959 Machine Tool Output Summarized

Numbers, types, and dollar values of metalworking machinery shipped during 1959 are summarized in a mid-year release issued by the Bureau of the Census and the Business and Defense Services Administration. The summary is based on Census Form M35W, "Metalworking Machinery," from 525 reporting companies. This form represents a consolidation of the Annual Census Form MA35W, "Machine Tools," and the quarterly report on Form BDSAF-173, "Report on Metalworking Machines," which was discontinued in 1959. Copies of the complete report (Series M35W-09, "Metalworking Machinery") are available at 25 cents per copy from the Bureau of the Census, Washington 25, D. C., or from field offices of the Department of Commerce.

The review reveals that shipments of metalworking machinery for 1959 totaled $680,000,000, compared with $672,000,000 shipped in 1958. Exports during the year were valued at $81,000,000, while the value of unfilled orders on December 31, 1959, totaled $357,000,000.

Shipments of metal-cutting type machine tools in 1959 totaled $469,000,000, compared with $463,000,000 in 1958. For 1959, shipment of lathes accounted for $119,000,000, grinding and polishing machines for $94,000,000, milling machines for $73,000,000, and boring machines for $46,000,000. Corresponding figures in 1958 were lathes, $99,000,000; grinding and polishing machines, $89,000,000; milling machines, $89,000,000; and boring machines, $52,000,000.

In 1959, shipments of metal-forming machinery were valued at $211,000,000, compared with $209,000,000 in 1958. Of the 1959 total, presses accounted for $85,000,000, and bending and forming machines for $36,000,000. Corresponding figures for 1958 were $77,000,000 for presses and $32,000,000 for bending and forming machines.

Overseas Machinery Trend Noted

Growing importance of overseas production facilities is noted in the Commerce Department's mid-year review and outlook for the construction machinery and equipment industry. Noting that the 1960 total will reach $1,700,000,000 (compared with the 1955-60 average of $1,900,000,000, excluding 1957), the report observes:

"Until 1958 the United States supplied an estimated 96 per cent of all free world production of construction machinery and equipment. Since then, eighty-five known facilities have been set up in foreign countries, currently producing many types and sizes of similar products. United States exports in 1960 are estimated at $350,000,000, the lowest for five recent years. Imports of construction machinery and equipment rose from $3,000,000 in 1956 to $15,000,000 in 1959."

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ELMIRA, N.Y.

PRODUCE MORE PRECISION PARTS AT LOWER COST

See

THE **NEW**

HARDINGE HIGH SPEED PRODUCTION MACHINES

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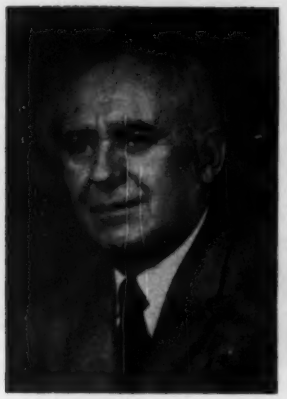
HARDINGE HIGH SPEED TOOL ROOM MACHINES

Presented On
PAGES 97, 99, 101, 103

Machinery
SEPTEMBER 1960



All Eyes Toward Chicago

THE BIG CITY on the shores of Lake Michigan again becomes the focal point for the management and production executives of all branches of the metalworking industry. There, from September 6 to 16, inclusive, will be held the Machine Tool Exposition—1960, sponsored by the National Machine Tool Builders' Association. It will be the first industry-wide exhibit of American-built machine tools since 1955.

On every hand will be evidence of the ingenuity of machine tool builders in anticipating the requirements of their customers. Imagination and know-how will be apparent everywhere. Probably the most striking feature of the exhibition will be the large number of numerical tape-controlled machines. This was to be expected because of the phenomenal development in the application of tape-control systems to various types of machines in the recent past. Such machines not only expedite the setting up of equipment for handling a variety of work, but also insure the rapid and accurate production of identical parts.

Mammoth machines will be in actual operation that necessitated the construction of deep concrete-lined pits in order that working areas might be brought into line with the viewing level of visitors. But there will also be small-scale machine tools developed to meet the requirements of miniaturization. Electrolytic grinding machines and electric-spark machines that enable the machining of exotic metals will create much interest.

There will, of course, be many standard machine tools that form the bulwark of equipment in the vast majority of machine shops and metal forming and stamping plants. These machines have been widely redesigned for easier operation, greater versatility, and increased power. In some cases, these objectives have been achieved with a reduction in overall size.

Two additional exhibitions of prime interest to the metalworking industries will run concurrently with the one just discussed. At the Navy Pier will be the Production Engineering Show which, since 1927, has been presented by agreement with the National Machine Tool Builders' Association. Manufacturers who make products that directly support prime production machinery will exhibit at this Show. There will be on display control equipment; machine components; auxiliary equipment and supplies; inspection, gaging, and testing devices; welding, riveting, heat-treating, and parts-cleaning equipment; and other products and service facilities.

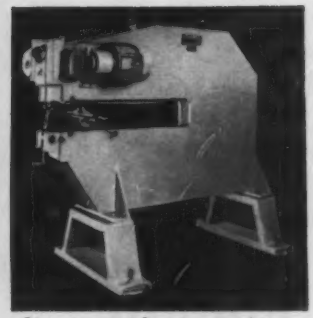
The third exhibit, the Second Coliseum Machinery Show, will be devoted to the display of machine tools and other equipment produced by manufacturers not only in the United States but also in other free nations of the world.

The following pages present descriptions of many of the new machines and other products that will be displayed at the three exhibitions. Obviously, no production executive of the metalworking industries can afford to miss these important events if he wants to keep himself informed concerning the latest manufacturing techniques and equipment.

Charles O. Herb

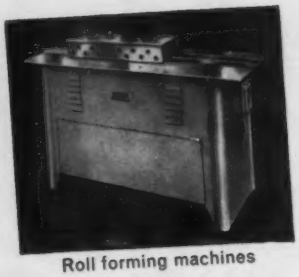
EDITOR

Combination shear, punch and coper

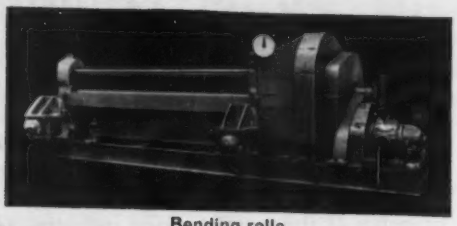


Shearing and forming machines

Arc welders

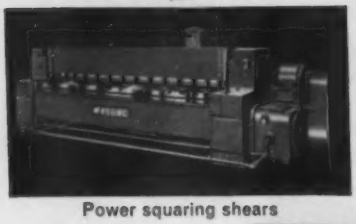


Roll forming machines

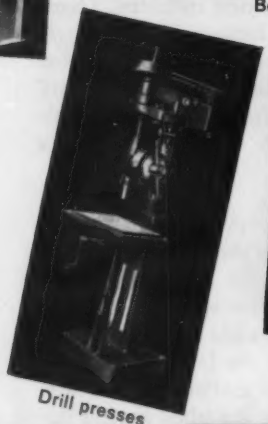


Bending rolls

Hack saws



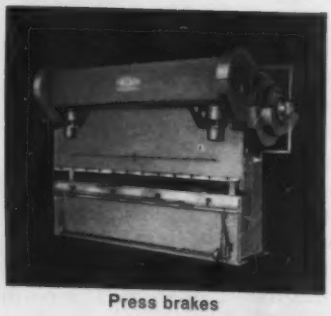
Power squaring shears



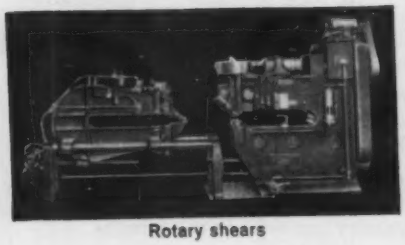
Drill presses

Straight side presses

Hoists

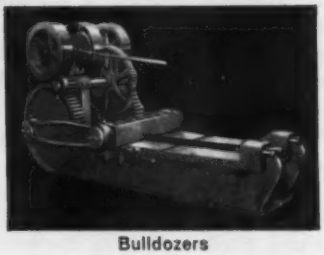


Press brakes



Rotary shears

Apron brakes



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PREVIEW

OF THE

NEW MACHINE TOOLS

TO BE SEEN AT THE

MACHINE TOOL EXPOSITION—1960

INTERNATIONAL AMPHITHEATRE

Chicago, Illinois

September 6 to 16

Preview of Exhibits

G. A. Gray to Exhibit Horizontal Boring, Drilling, and Milling Machine; Planer-Miller; and Duplex Planer

Booth 1350

Featuring digital tape program control, the exhibit of the G. A. Gray Co., Cincinnati, Ohio, will be highlighted by a horizontal boring, drilling, and milling machine, Fig. 1. One of the advances is the Tele-versal attachment which permits low mounting, resulting in constant rigidity, heavier feeds, and faster cuts. The 16-inch diameter quill has an 18-inch axial adjustment. The three-spindle work-head swivels and can be locked at any alternative angular position for multiple setup jobs. A jib crane with a 2000-pound lifting capacity is self-contained and rotates 360 degrees, making the operator independent of other shop facilities for tool changes.

Other features are a power-operated draw-bar, nonmetallic ways throughout, and an electric "woodpecker" multi-ton column and head that may be push-button-set to within 0.00025 inch. Another feature is a new Lubri glide traverse which supports the massive column assembly on a film of oil and air, making movement effortless.

The Gray Space Setter, an outstanding extra feature, is a unique numerical control system with full tape control. Developed by Gray in collaboration with Norden Data Systems, Division of United Aircraft Corporation, the Space Setter gives the operator a visual read-out which indicates at all times the exact location of a machine tool element. The system gives a simple dialing control of desired coordinates to obtain machine element movement, and offers tape control of moving parts in accordance with preplanned programming.

A simplified pendant station features complete control, including automatic clutch shifting for feed and traverse control. The duplex table permits one end of the table to be used while the other end is loaded and unloaded.

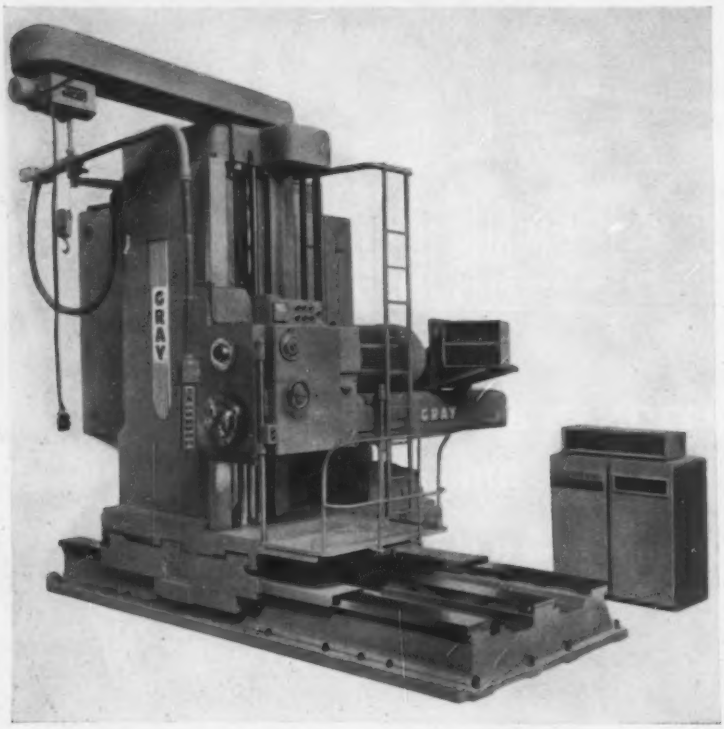
Another machine to be exhibited is a Model 660 FC horizontal boring, drilling, and milling machine with a 6-inch diameter nitrided spindle, 60-inch axial bar travel, 72-inch vertical head travel, 96-inch column travel on runway, 24-inch column cross travel, 50-hp spindle motor, and spindle speeds up to 900 rpm.

With the universal planer shown in Fig. 2, it is possible to finish-plane simultaneously while the planer is double-cut roughing. Precision cuts may be made at high speed, without a tool change. The machine is designed to use the conventional planer tools. A lever control transforms the machine from a conventional planer into a double-cutting high-producing planer. There is complete pendant control of the machine, including table movement, selection of feeds, selection of direction, and rapid traverse. These features reduce machining time, cut tool-setting time, and minimize machine-handling time generally.

In addition, the planer has all the characteristic features of the company's other machines, including nonmetallic table ways, Space-Saver drive with floating drive-shaft, safety stop and table replacer, loop lubrication, square-lock rail and column, improved head design, and other features that insure long life under the heaviest service. The Gray universal planer table measures 48 by 168 inches. Table speeds are adjustable to 300 fpm.

The new planer type milling machine, Fig. 3, incorporates new fea-

Fig. 1. Numerically controlled Model 660 FC boring mill is a heavy-duty machine incorporating the first application of the Norden Data Systems tape control



at the Amphitheatre

tures designed to reduce production costs. Lever-controlled spindle speeds up to 500 rpm are available. Rail leveling by power is a time-saving arrangement. The machine is equipped with patented nonmetallic bearings on all sliding surfaces to insure against scoring, to safely carry heavy work loads, and to materially increase machine performance by reducing running clearances. Housings, columns, and rails have square-lock design to absorb heavy cutting thrust in both forward and reverse table feeding directions. Table size is 48 inches by 16 feet.

The new Match-Maker attachment utilizes simple digital dial control for making spindle adjustments, formerly a major operation. Spindle tram adjusts in seconds, and spindle alignment may be adjusted as readily as spindle speeds for cutting various materials.

The Gray Hydro-Locks eliminate vibration and permit higher feed rates. They hydraulically clamp heads and quills automatically, insuring uniform cutting conditions and uniform standards of accuracy.

The Gray Sky-Hook supplied with this machine insures safe, fast power lifting and positioning when changing heavy, cumbersome cutters. The power-operated draw-bar secures shank type cutters.

Gray milling heads are available with Micro-Meter, a device for accurately registering quill position. It has zero-positioning, and can be read from the operator's normal working station.

The flying Scot planer, also to be shown in this booth, was described on page 180 in MACHINERY, May, 1960.

Circle 565 on Readers' Service Card

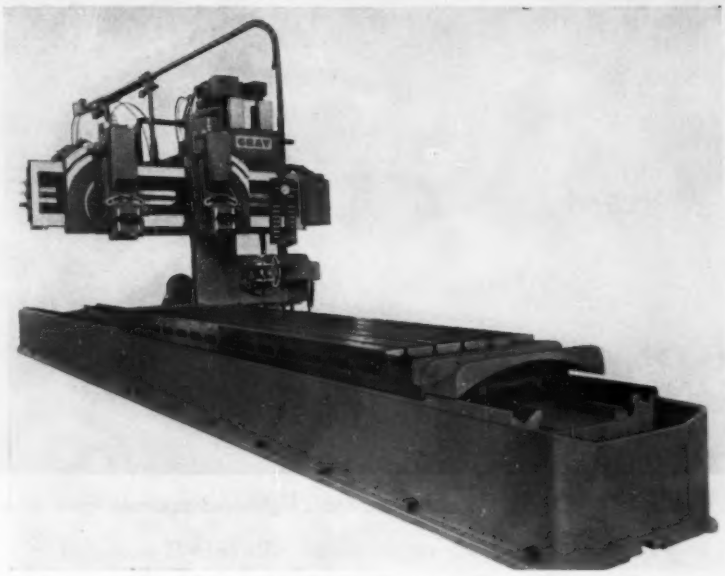


Fig. 2. (Above) Finish-planing cuts are made at the same time as roughing cuts to reduce machining time on the Gray universal planer. All tools are interchangeable with standard planer tools

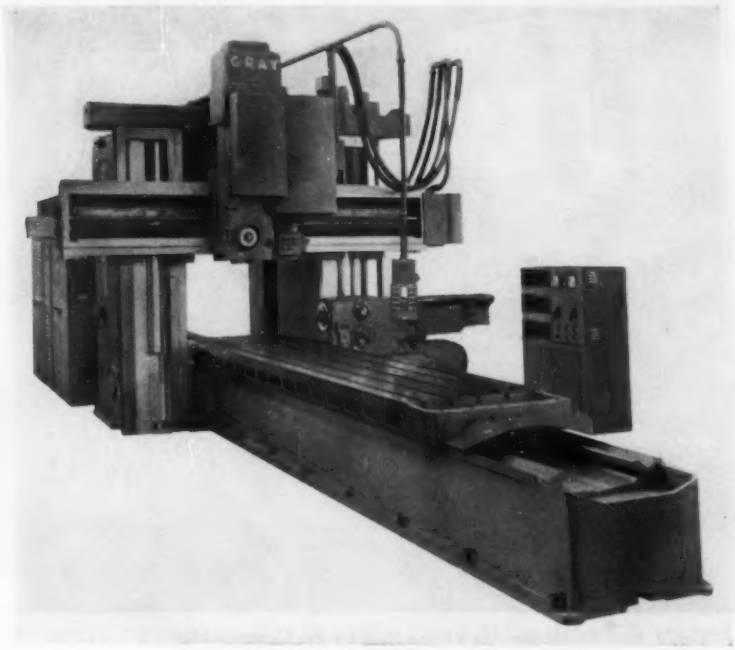


Fig. 3. (Right) A planer type milling machine that offers digital dial control in a fast, heavy-duty machine has lever-controlled spindle speeds up to 500 rpm

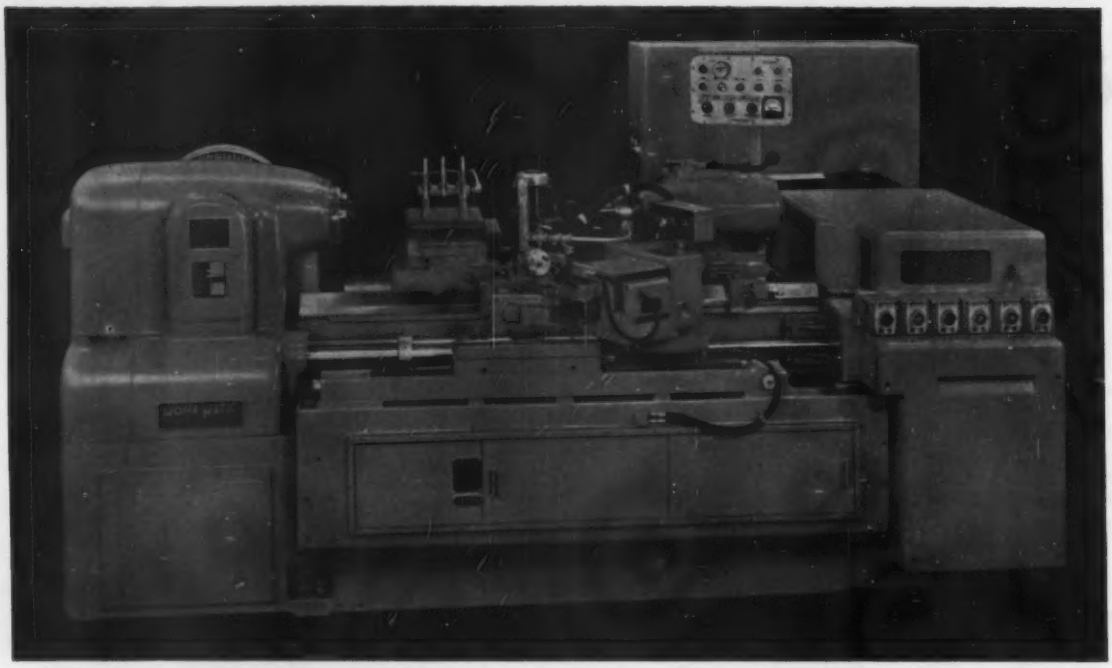


Fig. 1. Monarch Mona-Matic high-speed automatic cycle lathe with a four-cut cycle

Monarch to Exhibit Wide Variety of Lathes

Booth 701

The Monarch Machine Tool Co., Sidney, Ohio, will exhibit sixteen lathes in operation at the Show. Among these will be a Mona-Matic production lathe with multiple-cut cycling and a precision toolmaker's lathe for both toolroom and precision manufacturing applications. The newly developed Mona-Matic lathe (Fig. 1) is useful for heavy stock removal particularly when furnished with a four-cut cycle. The machine, however, may also be supplied for two-cut or one-cut cycle work. An "Air-Gage Tracer" system controls the hydraulically powered tool-slide of the lathe from a master template. In operation, stylus pressure against the template is only 5 to 6 ounces, and the template shape can be readily reproduced within $\pm$ 0.001 inch.

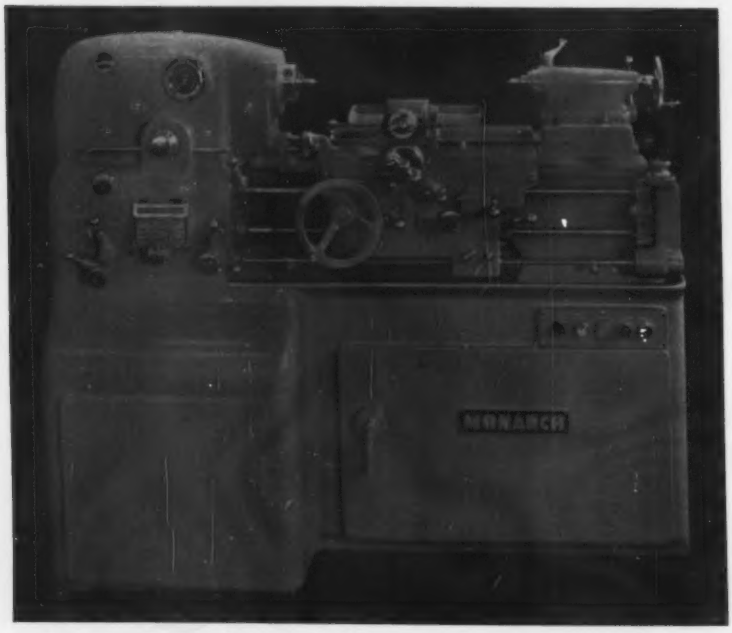


Fig. 2. Precision toolmaker's lathe built by the Monarch Machine Tool Co.

Front carriage feed and traverse are operated hydraulically. The feed rates are infinitely variable from 1 to 40 ipm and carriage traverse is 200 ipm. Facing and forming slide feed rate is 1/2 to 20 ipm, while the traverse is at 90 ipm, both hydraulically actuated. An adjustable positive stop controls maximum traverse of the facing and forming slide.

Five different feeds are available to the carriage for all cycles. Four-cut cycle machines have a selector switch for three-, two-, or one-cut operation. Two-cut cycle lathes may be used either as one- or two-cut cycle machines. Three spindle speed ranges are offered, the highest of these having a top speed of 2760 rpm.

For auxiliary machining operations, a rear-mounted facing and forming slide is furnished. It may be timed to take its cut as demanded by the nature of the work-piece. The machine is available in 18-, 30-,

and 42-inch center distances. Swing over the bed is 15 inches; over the front slide, 9 inches; and over the facing and forming slide, 9 1/2 inches. Special turning equipment available includes a two-position, automatic hydraulic turret; automatically operated chip and coolant guard; and a chip conveyor system.

The precision toolmaker's lathe to be demonstrated is the 10-inch Model EE lathe shown in Fig. 2. This lathe has a 5-hp direct-current drive motor that secures power through an electronic unit which can utilize almost any source of alternating current. Drive to the spindle is direct through multiple V-belts. No gears are employed in the spindle drive. Standard spindle speed range is infinitely variable between 5 and 3000 rpm; optional range, between 6.5 and 4000 rpm. A 3-inch D-1 American Standard camlock spindle nose is used for chuck and fixture mounting. A totally enclosed gear-box and end gearing provide a range of sixty threads and fifty feeds. Lubrication is automatic.

A complement of accessory equipment is available including an anti-friction bearing taper attachment and an "Air-Gage Tracer." For thread chasing, a combination of electric lead-screw reverse and variable reverse speed control may be factory applied. Also available is a manufacturing version of the lathe.

Circle 566 on Readers' Service Card

Fig. 1. Denison 25-ton Multipress capable of 600 strokes per minute

Denison Hydraulic Stamping and Compaction Presses

Booth 914

Denison Engineering Division, Columbus, Ohio, has announced a high-speed, 25-ton hydraulic Multipress for progressive stamping, and a Multi-Compaction press. Both presses will be displayed in operation at the Show. The 25-ton Multipress (Fig. 1) is hydraulically operated, servo-driven, and is capable of over 600 strokes per minute with variable stroke lengths of 1/4, 1/2, 3/4, 1, 1 1/2, 2, and 3 inches. Stroke length may be changed while the machine is cycling. Special ram strokes are possible by changing harmonic cams. A feature of this press is the ability to control punch break-through. At the Show, 3-inch wide by 0.025-inch thick silicon-steel stock will be fed by a Littell roll feed through a progressive die to produce two laminations per stroke.

The Multi-Compaction press is an automatic hydraulic unit specifically designed for the compaction of powdered metals, glass, and plastics. The equipment to be displayed will be a 1-ton, top and bottom ram press tooled for production of tantalum capacitor anodes at the rate of 25 per minute. Only tooling modifications are necessary to make it adaptable to a variety of powdered metal compaction operations. The tooling for producing the anodes is shown close-up in Fig. 2. A variety of other hydraulic presses, index tables, and control valves will also be shown.

Circle 567 on Readers' Service Card

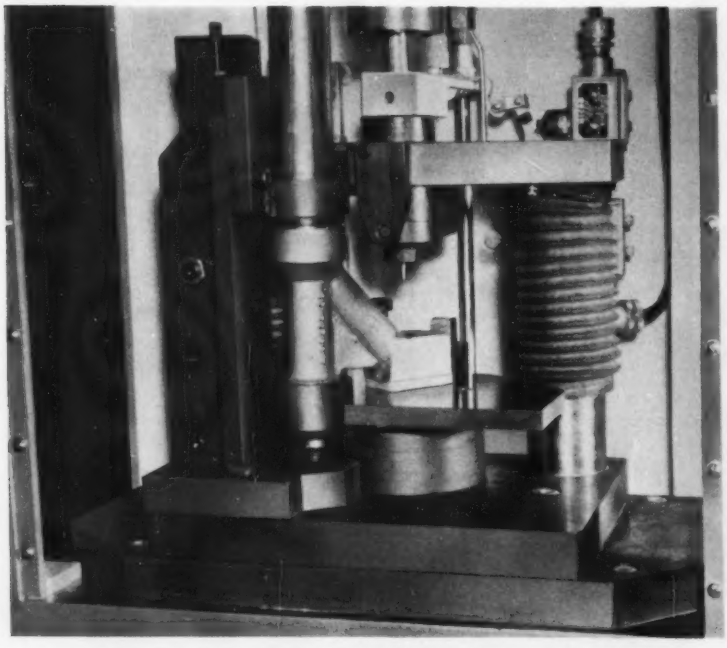


Fig. 2. Tooling for producing tantalum anodes set up on Denison hydraulic Multi-Compaction press

Covel Features Grinders and Optical Comparator

Booth 332

New equipment to be displayed for the first time by Covel Mfg. Co., Benton Harbor, Mich., will feature the Model 42A cylindrical production grinder, Model 30 optical comparator, and Model 10P surface grinder. The production grinder, Fig. 1, is an electronically controlled machine for doing cylindrical work on centers. The work is gaged in process through an electronic size control that supplies data to the feed motors. Final size is attainable automatically to a tolerance of ± 0.000050 inch, when needed.

Wheel wear has no effect on the final size. The gage is easily set to caliper the work, even in short runs. In production, the operator simply places the work between the centers, puts the gage on the work blank, and touches the cycle-start button. The machine's automatic sequencing takes over, starts the coolant, and grinding to size proceeds without further attention from the operator.

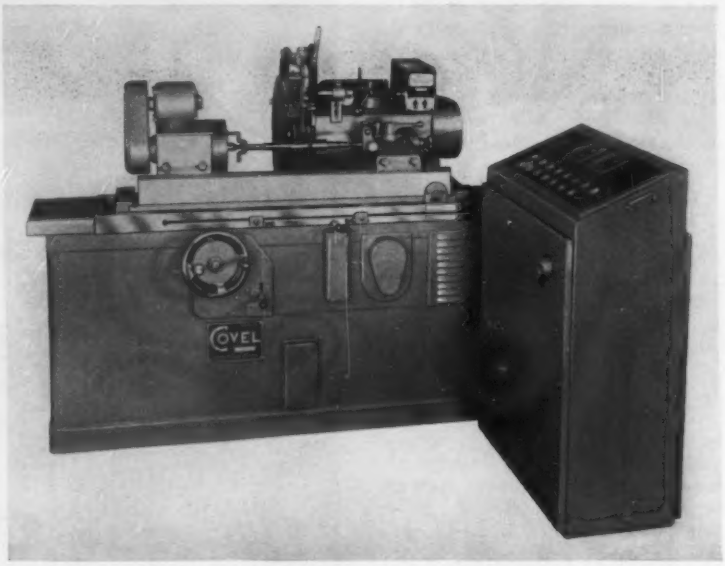


Fig. 1. Automatic cycling for plunge or traverse grinding, and automatic sizing, speed work on the Covel No. 42A cylindrical machine

Covel's No. 30 optical comparator has a 30-inch viewing screen, Fig. 2. The five lenses are turret-mounted inside the cabinet and selection is controlled from outside. Standard magnifications are 10×, 20×, 31 1/4×, 50×, and 62 1/2×. The stage has vertical and horizontal travel of 8 inches. It uses micrometers of 1-inch travel for measuring in both planes, and has provision for measuring rods or gage-blocks for the balance of stage travel.

The optical system uses relay lenses. Therefore, the projection

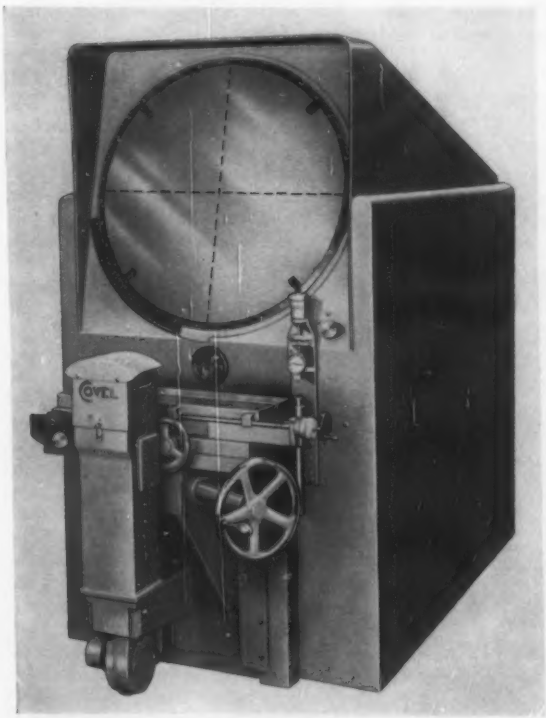


Fig. 2. The lens turret of the No. 30 optical comparator is inside cabinet, and has remote selector control of 5×

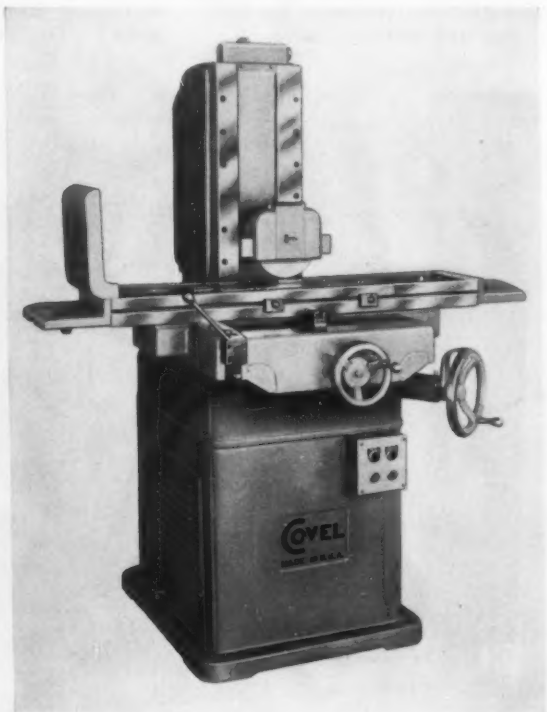


Fig. 3. Hydraulic table traversing control increases productivity of the Covel No. 10P surface grinder

lenses can be inside the cabinet. This arrangement permits maximum stage room because the lenses do not project over the table. The setup of the optics gives an upright image at all magnifications. The screen ring is graduated and has a 2-minute vernier. Because the ring is turned by a knob through a reduction gear, fine angular adjustments are easy to make. The stage table has a vernier on its built-in angular adjustment, allowing a 15-degree tilt to each side.

A power-assist on the Model 10P hand feed 6- by 18-inch surface grinder, Fig. 3, reduces grinding time. Operator effort is lessened, and the machine still offers all the advantages of quick setup for short runs. The table hydraulic power assist works by finger touch much the same as power steering on an automobile. A lever replaces the usual handwheel for controlling table speed and reversal. With the lever, the table can be slowed to a crawl for positioning. Setup is the same as for a conventional hand feed machine, but grinding time is cut almost in half.

Circle 568 on Readers' Service Card

Barnes Honing and Drilling Equipment and Immersed Drum Filter

Booth 152

Three honing machines, a mechanical drilling unit with 30,000-pound thrust, and an immersed drum filter for central coolant systems will be displayed by the Barnes Drill Co., Rockford, Ill. Newly designed for production honing of small diameter bores is a Model 122 vertical honer which has a 12-inch stroke and a 12-inch swing. This machine will handle bores up to 2 inches in diameter at a maximum stroke. Infinite hone-feed adjustment is controlled by an electric hone-expansion unit. Rapid expansion, rapid collapse, and automatic compensation for stone wear also are electrically controlled. Size is maintained within 0.0002 inch, bore to bore, by the BarnesdriL Plugmatic sizing unit. During the Exposition, the machine will be honing die-block bushings.

To demonstrate the honing of large-diameter bores, cylinder sleeves will be finished on a single-spindle Model 244 honing machine. This equipment, which will hone bores up to 4 inches in diameter at full stroke, is available with stroke lengths of 15, 25, and 40 inches and a choice of one or two spindles (Fig. 1). For full automation, it can be supplied with a wide variety of fixtures and tables, and equipped with automatic sizing, electric hone expansion, and automatic compensation for stone wear. For honing bores 1/4 to 1 1/2 inches in diameter, the company will also display a Model 10M1 honing machine described and illustrated on page 184 in September, 1959, MACHINERY. The machine has a 2 1/2-inch stroke and 10-inch swing. A wide range of automatic equipment is available.

A high-capacity mechanical unit for drilling applications will be displayed for the first time. Designed with a thrust capacity of 30,000 pounds, the unit, seen in Fig. 2, can be used in horizontal and vertical applications. This drilling equipment has a planetary type, all spur-gear drive. A spindle motor with output up to 30 hp can be furnished. The unit is powered by a 2-hp feed motor, and can be mounted on 18-inch or wider ways.

For large flows of coolant, including central systems, a pressure type immersed drum filter will be introduced. The filters are designed with capacities ranging from 150 to 1000 gallons per minute. Automatically indexing fabric passes around a drum which is immersed in dirty coolant, and the coolant is pumped through the fabric to a clean coolant distributor tank. Included in the filtration exhibit will be standard models of magnetic coolant separators and Kleenall fabric filters.

Circle 569 on Readers' Service Card

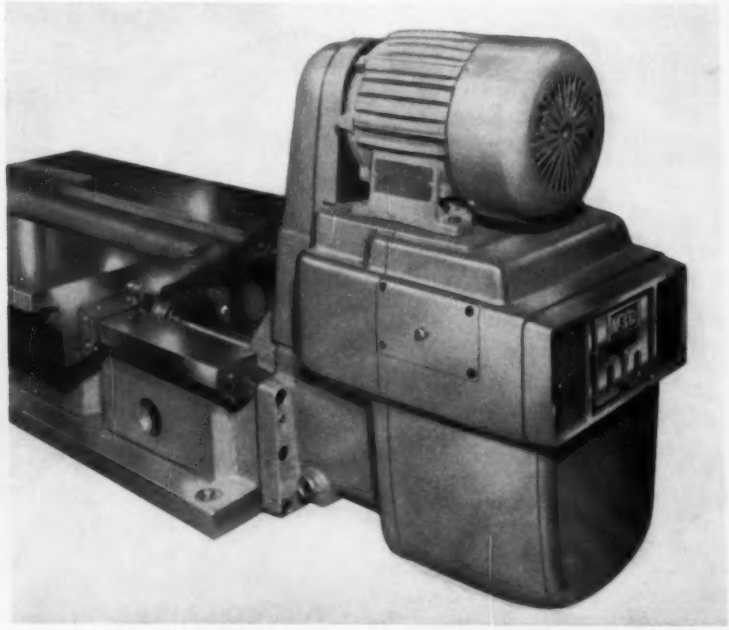


Fig. 1. (Left) BarnesdriL Model 244-2 vertical honer with automatic sizing. Fig. 2. (Right) Mechanical drilling units with high thrust capacity to be displayed by Barnes Drill Co.

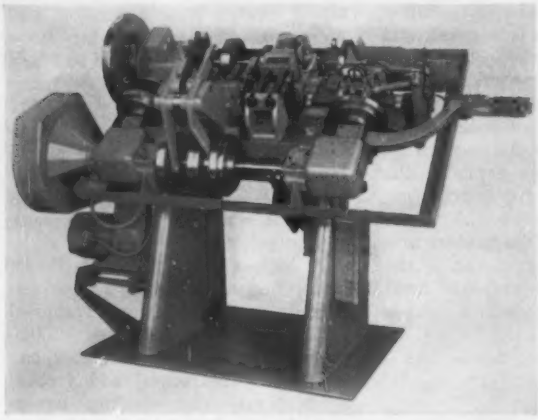


Fig. 1. Baird ribbon-metal and wire-stock forming machine set at a 45-degree angle

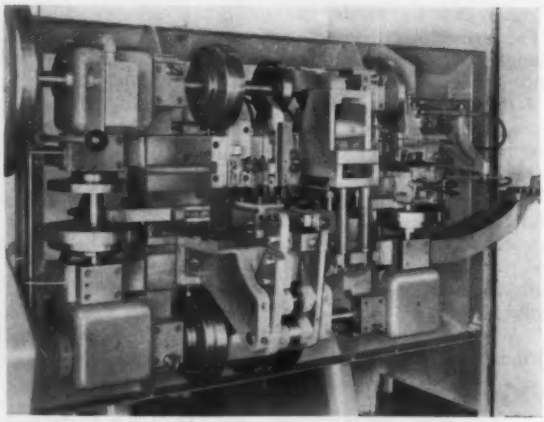


Fig. 2. Close-up view of forming machine (Fig. 1) arranged in a vertical position

Baird Exhibit Features Ribbon-Metal and Wire-Forming Machine

Booth 1142

Four machines—an eight-spindle automatic chucking machine, a vertical continuous operating type lathe, an inclinable ribbon-metal and wire-forming machine, and a transfer press—will be exhibited by the Baird Machine Co., Stratford, Conn. The newly developed forming machine, Figs. 1 and 2, is designed for high-speed production of parts from ribbon metal or wire stock. It will be shown completely tooled and in operation, forming cafe curtain brass rings 1 1/4 inches in diameter at the rate of 125 per minute. The production cycle will include a staking operation. This machine can operate at any angle from a vertical to a horizontal position.

The Baird eight-spindle automatic chucking machine, Fig. 3, which will be shown with all attachments has design features including a universal cross-slide, two longitudinal feeds, and the ability to stop and position spindles. All attachments for the vertical continuous operating type lathe will also be displayed. This lathe can produce up to 1800 pieces per hour, with either automatic or manual work loading and unloading setups being available.

The multiple transfer press, seen in Fig. 4, is designed for production of stamped and drawn parts from coiled stock. One part is completed at each stroke, with as many as fourteen or fifteen operations having been performed as it transferred through the dies.

Circle 570 on Readers' Service Card

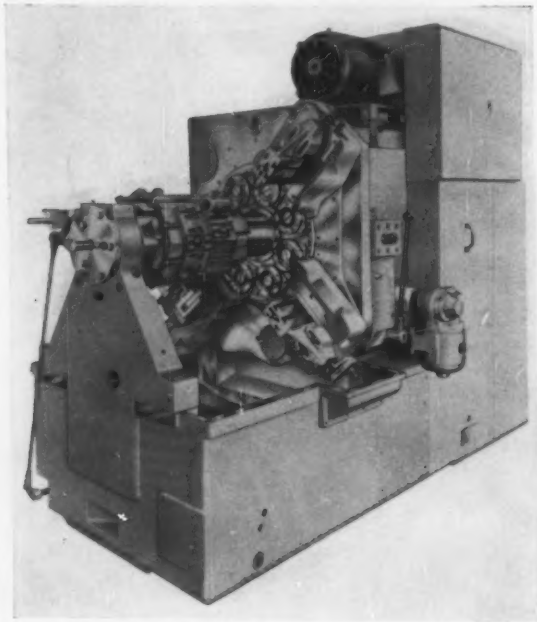


Fig. 3. Baird eight-spindle automatic chucking machine incorporates new design features

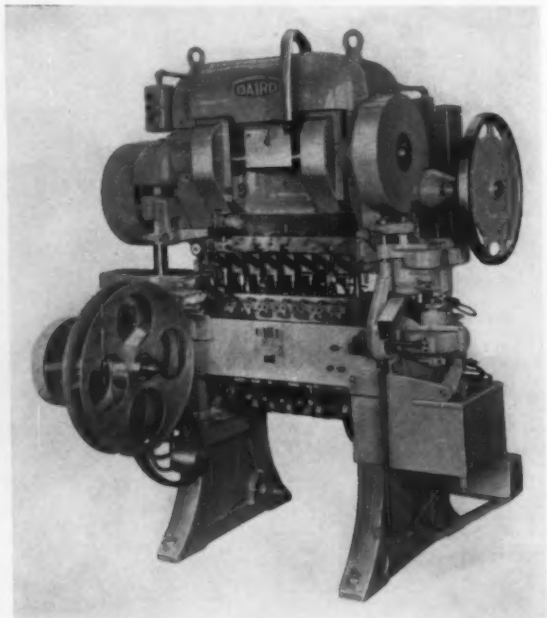


Fig. 4. Transfer press for high-speed operation to be shown by the Baird Machine Co.

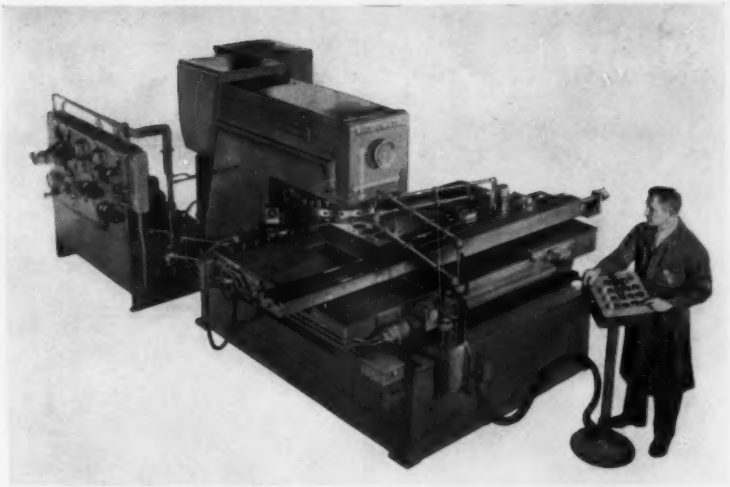
Flexible Fabrication of Sheet and Plate is Theme of Wiedemann Exhibit

Booth 1249

Seven automatically positioned fabricating machines will be operating in the Wiedemann Machine Co., King of Prussia, Pa., exhibit demonstrating tape control and template control.

Highlight of the exhibit will be the 15-ton capacity Wiedematic turret punch press with numerical positioning control. Holes will be automatically located and pierced at the rate of sixty per minute, including tool changing. Actual jobs will be produced demonstrating the speed and flexibility of the machine and controls. The press will pierce a 3 1/2-inch diameter hole in 14-gage mild steel. Sheets to 30 by 48 inches by 3/16 inch can be positioned and pierced in a single handling. The press operates at 200 strokes per minute; the table moves at the rate of 500 ipr. These extremely high speeds make it possible to accurately position and pierce so many actual production holes per minute. Turrets carry from twenty-six to thirty-two different punches and dies, each accurately aligned. Any set of tools is rotated into piercing position as required by tape command.

The control system uses standard eight-channel, 1-inch wide punched paper tape, which is easily prepared on a standard tape-making typewriter. The tape carries three-place decimal dimensions for the X and Y coordinate hole center-line dimensions and turret station location, as programmed for each hole. To complete a run of work, all the operator needs for setup is the sheet size, lot quantity, and a punched tape.



The 15-ton Wiedematic tape-controlled turret punch press will locate and pierce sixty accurately positioned holes per minute

Circle 571 on Readers' Service Card

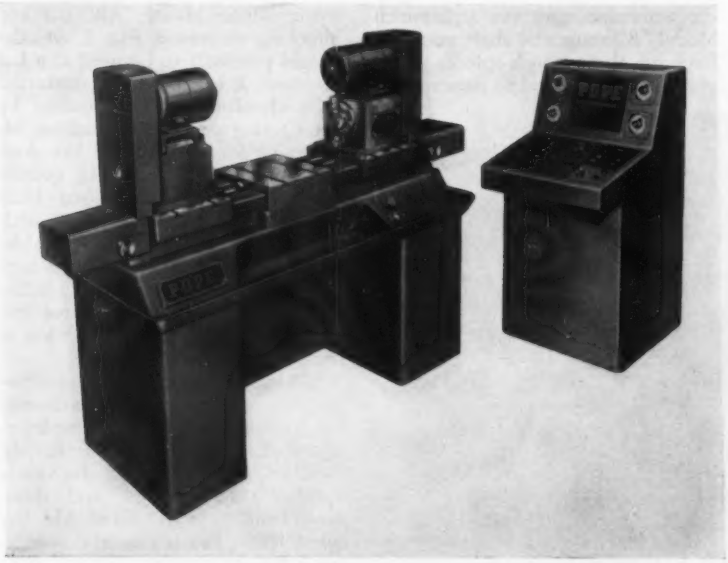
Pope Double-End Horizontal Machine Bores Round Within 0.000020 Inch

Booth 482

A machine tool that simultaneously bores opposing holes to high accuracy will be shown for the first time by Pope Machinery Corporation, Haverhill, Mass. Holes are round within 0.000020 inch. Fast production is achieved by moving the two heads independently according to a program arranged in the new Pope Electric Programmer, which is part of the Model 10-6 horizontal boring machine.

The programmer is a unified control in a console that can be placed convenient to the operator. It provides fully automatic cycling, enlarged flexibility, and shorter set ups. Using the programmer, the start for the two boring heads can be synchronized easily. But after the start, the heads may move through independent cycles; or the progress of either head can be set to trigger motion of the opposite head. The programmer also controls rapid traverse, fine feed, dwell time, and rapid traverse-reverse, coolant flow, auxiliary machine accessories, and, when needed, clamping of parts.

The basic machine tool has fully shielded, hardened and ground rectangular ways with constant lubrication of bearing surfaces. Heavy-duty, micrometer-style depth stops are located on the center lines of the slides in such a position as to prevent tool deflection. The boring head slides and the accessory work-table cross-slide are actuated hydraulically. With



Extra precision in hole roundness is achieved by a new electrically programmed Pope horizontal boring machine

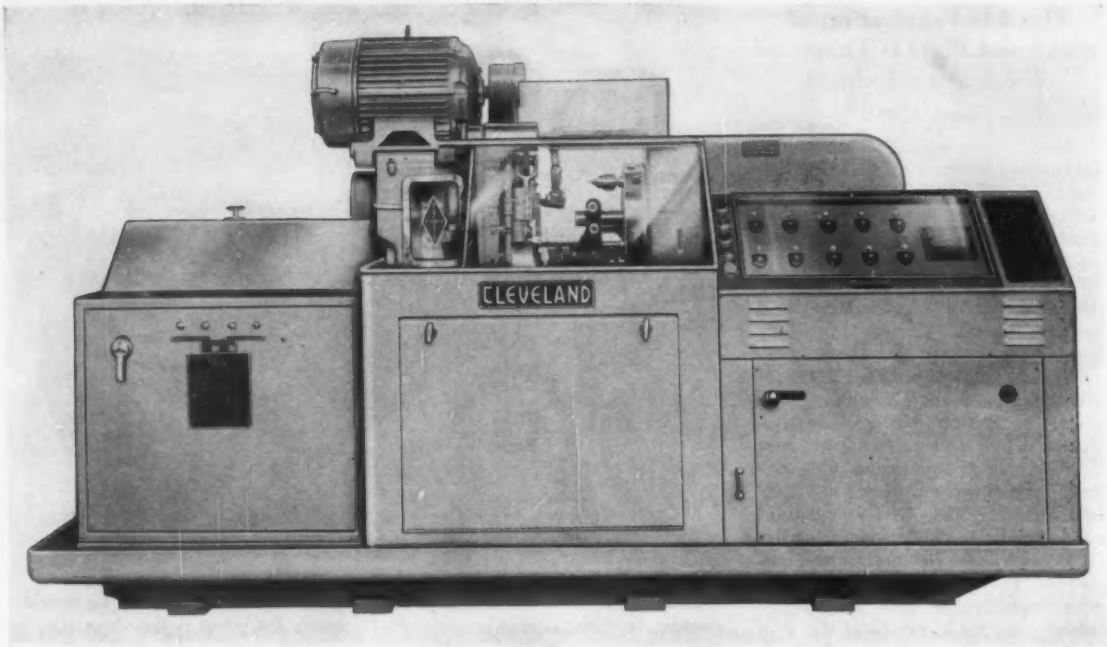


Fig. 1. Tooled as a chucking lathe, Model "AB" 3-inch Dialmatic bar and chucking automatic has a new speed-feed monitor

all rotating parts in full assembly, the boring heads are dynamically balanced to limit runout to 0.000025 inch. Motors up to 1 hp and 3600 rpm may be selected for the spindle drives. Other optional accessories are double or multiple spindle boring heads for miniature bores on tight center-to-center distances.

The machine illustrated has the two heads opposed at 180 degrees. Arrangements with the heads in different relation are available, as well as setups with three, four, or more heads, as required.

Circle 572 on Readers' Service Card

Four Cleveland Single-Spindle Automatics Demonstrated on Production Jobs

Booth 900

The Cleveland Automatic Machine Co., Cincinnati, Ohio, will exhibit four single-spindle automatic lathes: the 3-inch Model "AB" bar and chucking automatic, the 1 5/8-inch Model "AB" Dialmatic, the 2 1/2-inch Model "AW" single-spindle automatic, and the 1 5/8-inch Model "B" automatic shaft machine. Each of these single-spindle automatics will be tooled to demonstrate outstanding production jobs which will show an improved line of Cleveland tooling, automatic parts loaders, pick-off attachments, high-pressure oil feeds for deep-hole drilling, and LeBlond's Regal tracer attachment.

While the single-spindle Dialmatic 3-inch Model "AB" bar and chucking automatic, Fig. 1, was designed primarily to be used as a bar machine, it can be easily converted to a chucker in thirty minutes by substituting a simple chucking attachment for the standard bar stock feed assembly. It has 112 spindle speeds ranging from 24 to 1820 rpm, and all ten turret feeds are dial-controlled and infinitely variable, thus providing quick setup. The new feature which has been added is the feed monitor which indicates the exact feed for each turret position in inches per minute.

Model "AB" Dialmatic is an ultra-modern, single-spindle automatic bar machine of 1 5/8-inch capacity, Fig. 2. It has ten automatic infinitely variable spindle speeds for each cycle of the machine and these range from 40 to 3100 rpm. The ten turret feeds, like the spindle speeds, are infinitely variable and are dial-controlled. The new features of this machine are the addition of the spin-

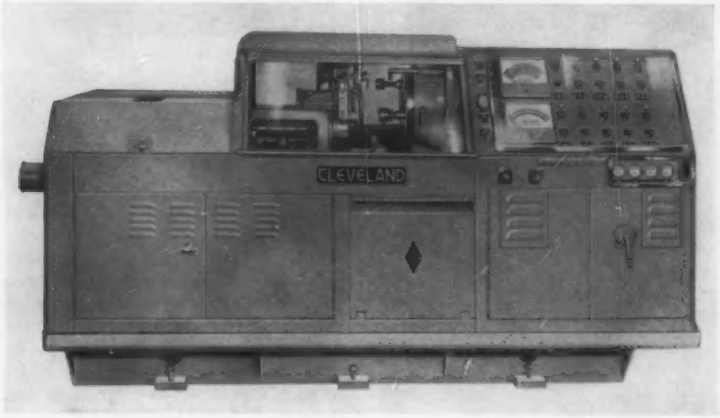


Fig. 2. Model "AB" 1 5/8-inch Dialmatic will be demonstrated doing the complete machining of a yellow brass valve bonnet

dle speed and feed monitors which accurately indicate spindle speed, in revolutions per minute, and the feed, in inches per minute, for each of the turret positions.

A third machine on display was designed for users who prefer an economical automatic equipped with mechanical speed and feed drives. It has forty spindle speeds ranging from 69 to 1920 rpm. The two new features of the 2 1/2-inch Model "AW" single-spindle automatic (see Fig. 3) are: a completely new type of feed bracket, including automatic air operated clutches; and the addition of complete guarding. For the exhibit this machine will be tooled to produce a hose-barb part from 3/4-inch, hexagonal, Type 303 stainless-steel bar. This part will be machined complete including gaging, spot-drilling, rough-turning, rough-forming, drilling a 15/32-inch diameter hole 2.687 inches in depth using high-pressure oil feed, finish-forming, cutting 3/8-inch-18 NPT threads, and cutting off with an independent cutoff attachment. The total production time for each piece will be 165.6 seconds.

Also on display will be the 1 5/8-inch Model "B" automatic shaft machine (not shown) tooled to produce a mandrel from 7/16-inch drill rod. The machining operation includes gaging from a swinging gage stop, steadyrest turning with the LeBlond Regal tracer, and cutting off with a tool mounted on the rear cross-slide. This is not a turret type automatic, but was designed primarily for shaft, pin, stud, spindle, and arbor work requiring a number of turning and forming operations. It has twenty spindle speeds ranging from 127 to 2017 rpm. The new feature of this machine is the incorporation of a LeBlond Regal tracing attachment on a single-spindle automatic bar machine. The addition of a tracer to an automatic offers high productivity for all types of shaft and spindle machining. The total production time per piece will be 23.1 seconds.

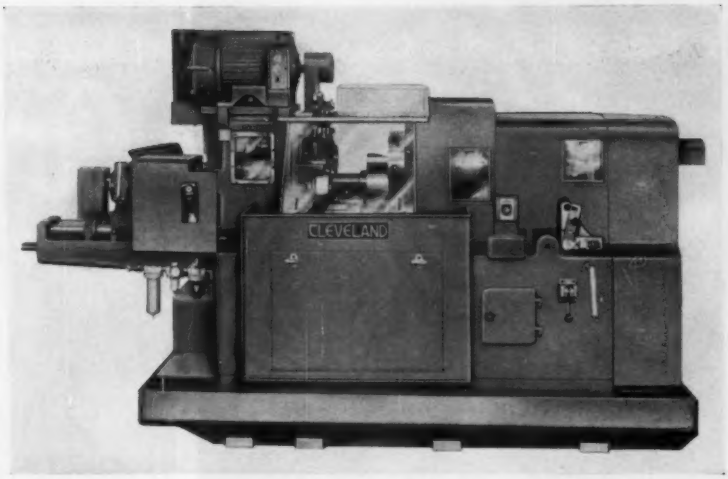


Fig. 3. New guarding and a new feed bracket are outstanding in the 2 1/2-inch Model "AW" single-spindle automatic

Circle 573 on Readers' Service Card

Illinois Tool Works Gear-Measuring Equipment

Booth 242

The Illinois Tool Works, Chicago, Ill., will exhibit a variety of gear-checking equipment. Featured will be a completely automatic gear-inspection instrument capable of checking up to 600 gears per hour. The instrument (Fig. 1) can be assembled with multiple stations as required. Although checking may involve making direct pin diameter or pin radius readings if desired, the basic principle of the instrument involves the use of master gears. Inspection can vary from the usual composite check to semi-analytical checks using electronic circuitry. A memory device accepts or rejects gears according to prescribed tol-

Fig. 1. Illinois Tool Works completely automatic final gear-inspection instrument

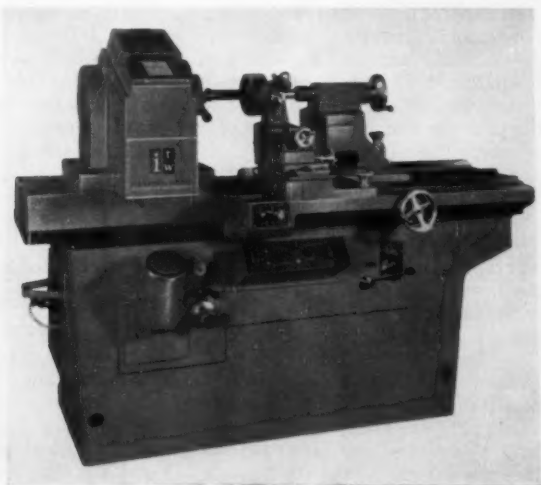


Fig. 2. Helical lead-measuring instrument equipped with optical setting device

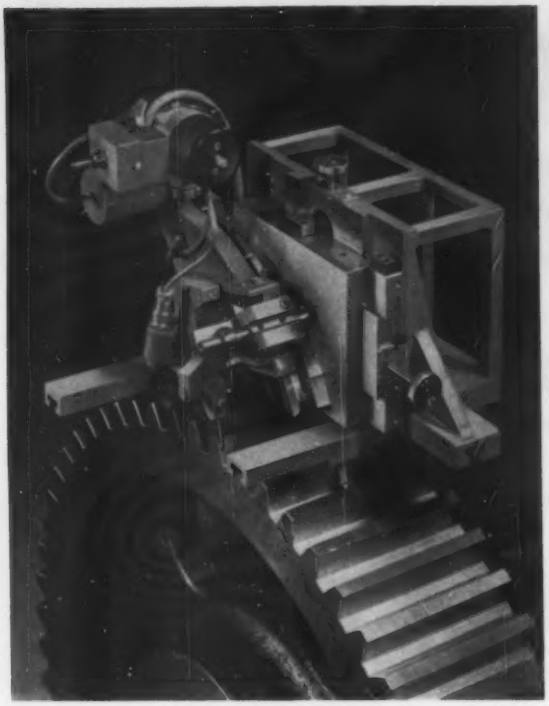


Fig. 3. Portable involute profile-measuring equipment

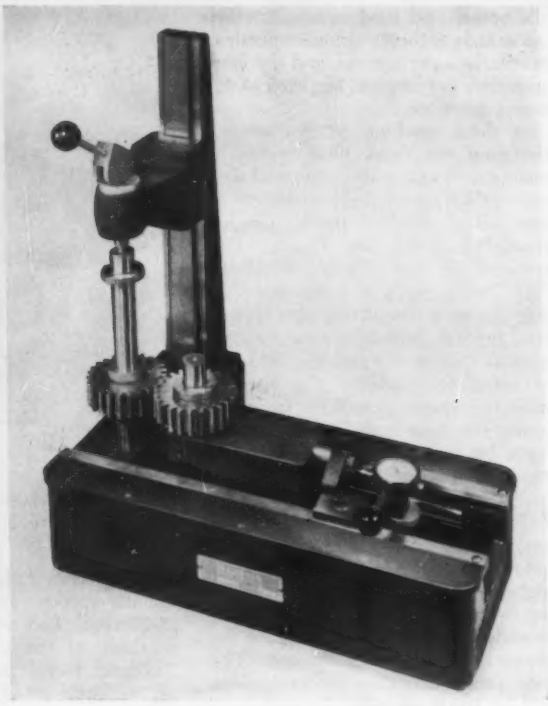


Fig. 4. Hand gear-rolling test instrument

erances and sorts gears into size classifications for mating in assembly. The unit on display will check pitch diameter runout, size, and nicks. Additional stations can be added to check bore, wobble, involute profile, maximum lead, and average lead errors.

The helical lead-measuring instrument, Fig. 2, is equipped with a large screen and a direct-reading optical setting device. The sine bar setting drive is powered, and all machine and recording controls are conveniently arranged for speed in operation. A 15-inch diameter graduated disc is mounted directly to the sine bar and is accurate to plus or minus 1 second of arc.

A newly developed portable involute profile-checking instrument (Fig. 3), also to be displayed, was designed for testing production gears which are too large or heavy to check on existing measuring equipment. The instrument is lightweight (approximately 20 pounds) and can easily be carried to the production machine for in-process checking. It locates directly in the gear teeth by means of three ball feet. In operation, a powered indicator follows the theoretical involute path through contact with a variable cam, and the indicator finger measures any deviation of the gear tooth. The measurements are independent of diametral pitch and the instrument will check any involute gear, either spur or helical, from 24- to 200-inch base diameter.

Also to be shown is the production type gear-rolling instrument seen in Fig. 4 which is for on-the-spot quality control at the gear cutting machine. In this instrument, production gears are rolled against a suitable master, and errors are reflected as center distance variations by a 0.0005-inch dial indicator.

A variable involute profile-measuring instrument that maintains the concept of base circle checking without requiring fixed base circles for each gear size will be displayed.

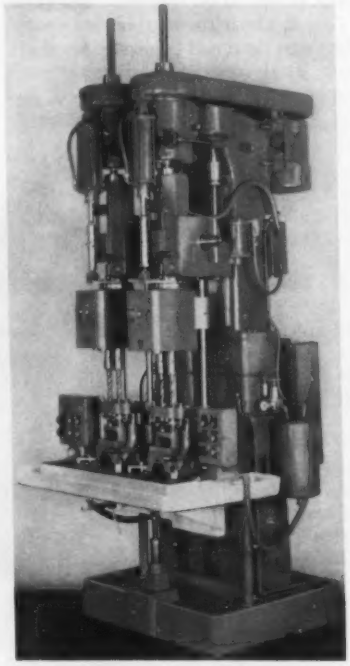
Circle 574 on Readers' Service Card

Chas. G. Allen to Exhibit Drilling Machine

Booth 148

The exhibit of Chas. G. Allen Co., Barre, Mass., will feature a two-spindle drilling machine equipped with a positive-drive power feed. The machine cycle is push-button controlled and consists of power rapid traverse, feed, and adjustable dwell. A torque–limiting clutch is employed in the machine feed. The power feed can be automated in combination with index-tables or transfer fixtures and can be tape controlled.

Circle 575 on Readers' Service Card



Drilling machine with positive-drive feed built by Chas. G. Allen Co.

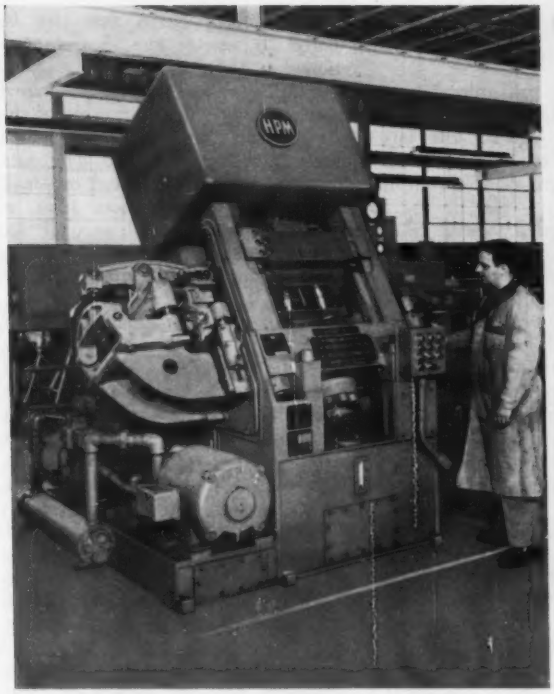


Fig. 1. Smooth-edge blanks are produced without burr by this triple-action H-P-M press from special dies

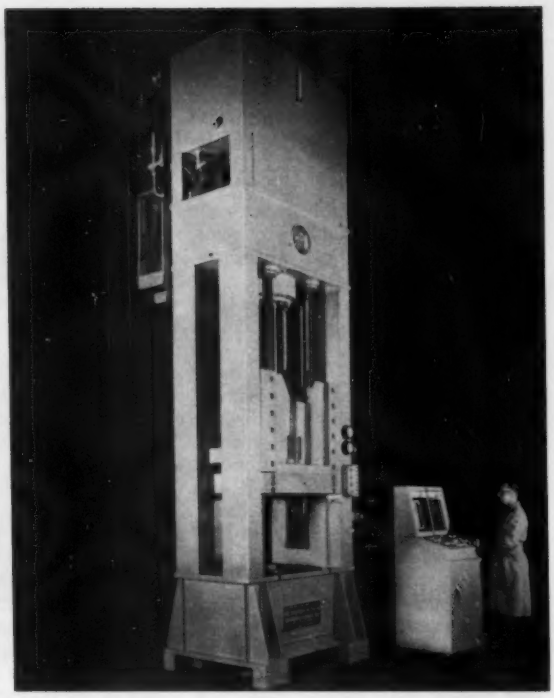


Fig. 2. Electronic servocontrols on this standard 200-ton press give operator remote control of all adjustments

New H-P-M Presses Shown in Full-Scale Operation

Booth 1011

Edge burrs are so greatly reduced on cams stamped by a new hydraulic triple-action H-P-M press, Fig. 1, that they can be assembled direct from the dies without shaving. This approach to smooth-edge blanking will feature the working demonstration by the Hydraulic Press Mfg Co., division of Koehring Co., Mount Gilead, Ohio. The specially tooled machine delivers 120 strokes per minute. It operates from coil stock with automatic roll feed or strip stock. Metal thickness and type of metal can be changed without press adjustment.

The 200-ton blank-holder press, Fig. 2, is a standard metalworking press equipped complete with electronic servocontrols. From the operating console these controls permit infinite adjustment of ram speed, daylight, stroke, and programming of ram speed changes at predetermined positions. It is never necessary for the operator to leave his station to make a press adjustment. As a standard option, tape or punched card control can be substituted for the usual operator when full mechanization is needed.

A 75-ton high-production Henry & Wright dieing machine, Fig. 3, featuring double-crank construction, will be exhibited for the first time in operation. This press will be equipped with roll feed, scrap cutter, a motor-driven cross-head adjustment, recirculating lubrication, and thermoswitches on all main bearings.

Circle 576 on Readers' Service Card

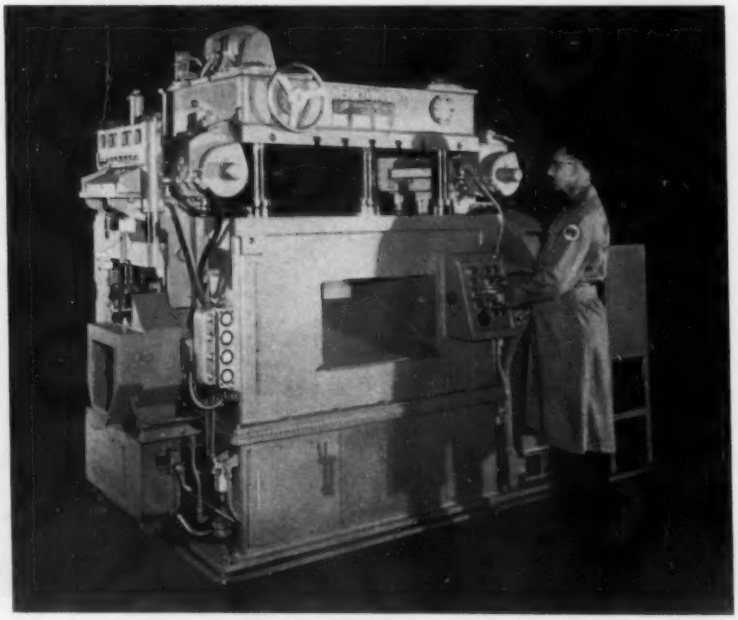


Fig. 3. Double-crank design of this new 75-ton version of the Henry & Wright machine spells high productivity at low cost

Brown & Sharpe Exhibits New, Improved Equipment

Booth 452

Increased productivity and closer precision will keynote the exhibit of machine tools by Brown & Sharpe Mfg. Co., Providence, R. I. Prominent among the displays will be a new line of No. 2 milling machines, Fig. 1. Styles available are plain, universal, and vertical millers in 3-, 5-, and 10-hp capacities. Among the milling machines will be the newly designed, sliding head Rangemasters.

The new milling machines have many built-in or optional features not found in earlier models, including numerous exclusive accessories. All are furnished with automatic cycle, rise and fall of the knee, and a backlash eliminator. The machines, in addition to being more rugged and heavier, have all sliding bearing areas substantially increased. The working surface of the table has been increased to 13 by 55 inches, and the vertical travel increased on 3-, 5-, and 10-hp models. To facilitate milling with carbide cutters, a flywheel is standard equipment on the 5- and 10-hp models, and optional in the 3-hp sizes. The lubrication of all moving parts is completely automatic.

These machines were designed on the building-block principle and can be furnished in 132 different working combinations, giving the customer a machine tool, custom-made to his requirements, virtually from stock.

A newly designed No. 5 plain grinding machine, Fig. 2, with Ceda/Size equipment will be demonstrated. This machine is furnished with a removable cartridge wheel spindle in either plain or anti-friction bearing design. The headstock drive is sealed by O-rings, resulting in extremely smooth operation. The wheel sleeve and guard accommodate a 16-inch grinding wheel from 1/2 inch to 2 inches wide. The optional Ceda/Size equipment will permit a semiskilled operator to plunge grind, on a production basis, to any predetermined size to within plus or minus 0.000010 inch.

The Numericam, a tape-controlled cam milling machine, Fig. 3, developed by the company, will be part of the exhibit. This is a modified version of the B&S No. 2 vertical milling machine with General Electric Mark II universal positioning control. Unusual contours can be machined, including cylindrical, conical, and flat-surface master cams. Hole patterns can also be bored in any of the shapes mentioned.

Master cams can be machined using a fully automatic cycle of the Numericam, controlled by 1-inch wide, eight-channel tape. The data for the tapes is calculated on small research type computers such as IBM 610 Autopoint, Bendix GP 15, or Autonetic's Recomp II. Thus, the preparation of cam tapes is inexpensive.

A new grinding machine headstock, Fig. 4, incorporating hydrostatic bearing design, will demonstrate the highest accuracy yet obtainable for roundness and end camming. It is possible to grind rounds within ten millionths of an inch using this headstock, the builder claims.

Brown & Sharpe will show and demonstrate many new attachments and accessories designed to increase the productive and work capacity of its automatic and hand screw machines.

A newly developed broaching attachment will be shown on the 1 1/4-inch No. 2 automatic screw machine that broaches both the front and back ends of the workpiece along with other operations.

A fourth-slide attachment will be demonstrated on a 3/4-inch No. 2

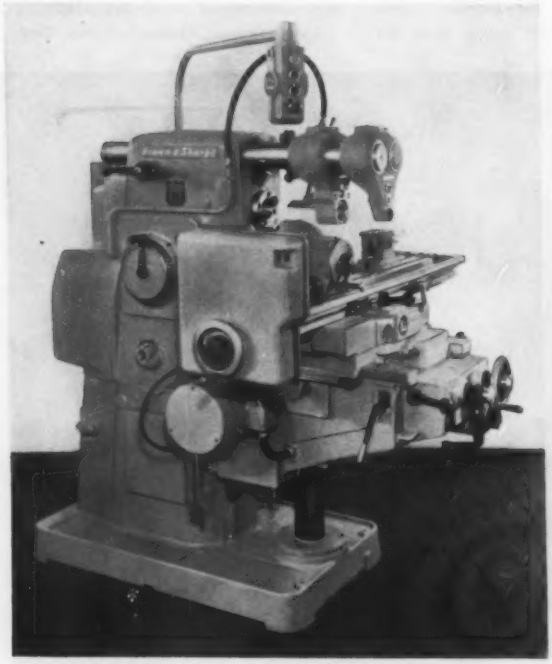


Fig. 1. The new line of No. 2 milling machines are of modular construction, providing 132 different combinations of accessories

Fig. 2. Ceda/Size equipment on the Brown & Sharpe No. 5 plain grinder enables semiskilled operators to grind to plus or minus 0.000010 inch

automatic which increases the machine's tooling capacity and work potential. This slide will do forming or cutting-off work and leaves the rear cross-slide available for back attachments such as cross-drilling.

An automatic gaging attachment and broken drill detector will be shown in operation on a 1/4-inch No. 00 automatic at 8360 rpm. The gaging attachment checks the size of the work-piece as the operations are completed, shuts down the machine if tolerances are exceeded, and eliminates the need for further inspection of the piece. The broken drill detector is particularly beneficial when using small diameter drills. Should the drill break in the hole, the machine shuts down before damage occurs to the tooling in the sequences which may follow.

A floating spindle liner and braking device will be demonstrated feeding stock to a No. 00 cutting-off machine operating at 10,000 rpm.

A Brown & Sharpe Model B automatic turret drilling machine with a 15- by 20-inch B&S positioning table controlled by a G-E Mark II numerical control system will also be featured in actual demonstrations on work-pieces to show the capabilities of this equipment. A second Model B turret drilling machine with manual control will be demonstrated using the new B&S universal trunnion fixture. With the standard fixture, work can be oriented in relation to the drill spindle at seven different angles from 0 to 90 degrees.

A deep-hole drilling machine will be on view featuring increased work-holding capacity without loss of rigidity for short runs. This machine was announced in MACHINERY, May, 1960. Similarly, Model 618 Micromaster slicing and dicing machine, described in MACHINERY, June, 1960, will be on view, cutting wafers of the highest quality from semi-conductor materials with extreme accuracy.

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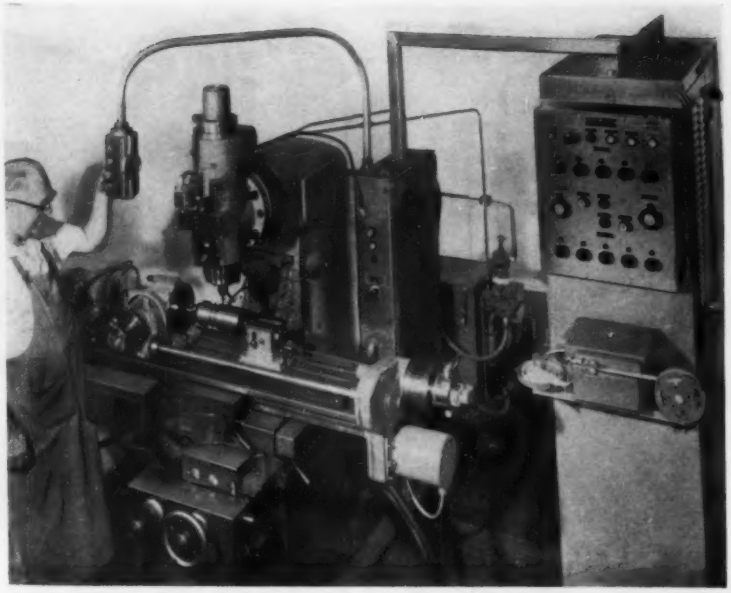


Fig. 3. Cams are generated automatically on the Numericam tape-controlled miller working under General Electric Mark II tape control

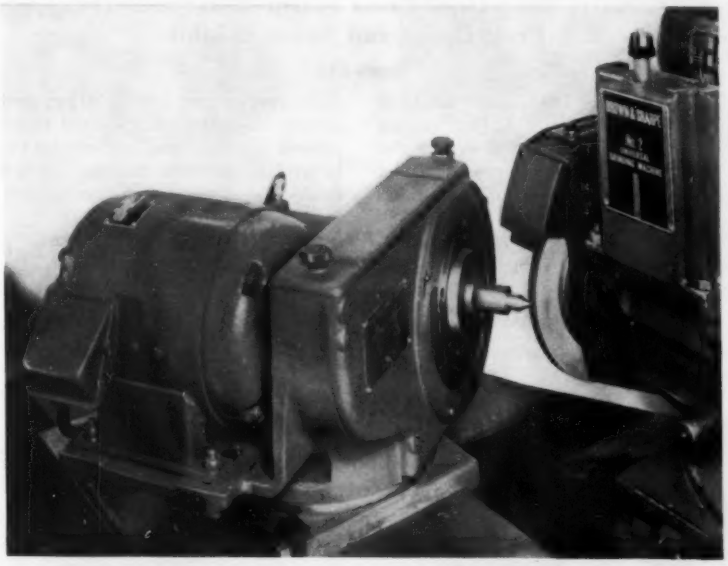


Fig. 4. The highest accuracy for roundness obtainable in a grinding machine is made possible by the unique bearing arrangement of the Brown & Sharpe hydrostatic headstock

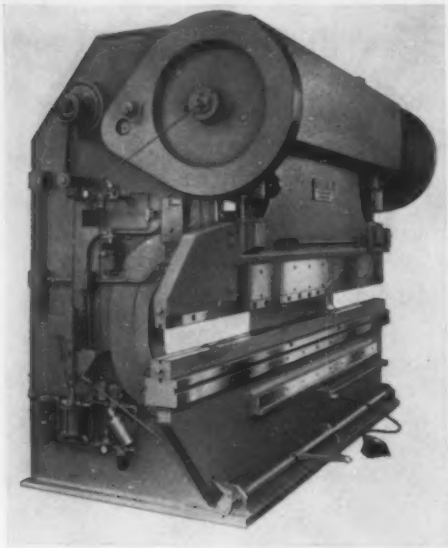
Lipe-Rollway Bar Feed for B&S High-Speed Automatic

Booth 452

The Lipe-Rollway Corporation, Syracuse, N. Y., will have an on-the-spot demonstration of their Model 56 AML bar feed. This equipment will be shown feeding stock to the new Brown & Sharpe automatic which operates at the high spindle speed of 10,000 rpm. It will be shown assisting in the production of a brass part machined at the 10,000-rpm spindle speed.

In designing the feed, the tremendous centrifugal force created by the high spindle speed presented, at first, what seemed an almost insurmountable feeding problem. No practical amount of counteracting force was able to move the stock forward against the clamping effect of the centrifugal force. The problem was solved by installing a floating spindle liner in the AML bar feed. A brake was applied to the floating liner to cancel out the effects of the centrifugal force. The floating spindle liner revolves on a special set of long-life nylon bearings, and brakes when the collet opens.

Circle 578 on Readers' Service Card



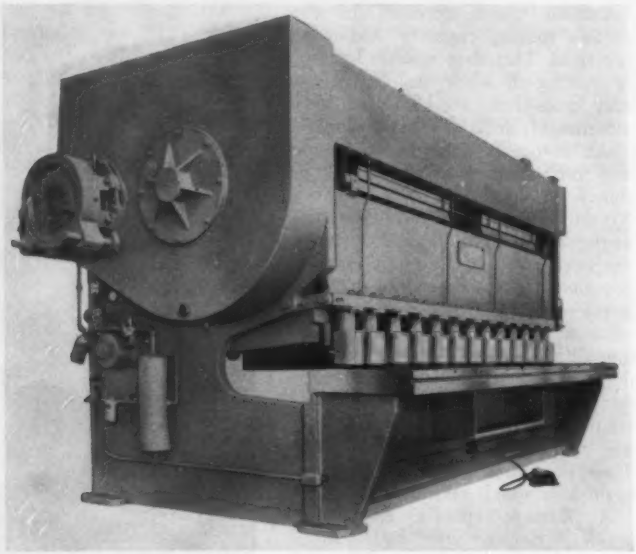


Fig. 1. (Left) A heavy, welded, fabricated steel frame characterizes Steelweld mechanical press brake
Fig. 2. (Right) Automatic lubrication of all principal moving parts is standard on Model 8D-12 shears

Novel Deep-Draw Press Featured in Steelweld Press Brake and Shear Exhibit

Booth 814

The Steelweld Machinery Division of Cleveland Crane & Engineering Co., Wickliffe, Ohio, will exhibit the 300-ton Speed-Draw press, Model S2-300-72-48SD (not shown), which delivers operating speeds 80 per cent greater than that of standard crank presses having equal mid-stroke velocity. It permits making longer draws at higher speeds than shallow draws that can be made on a standard crank type press. The deep-draw feature frequently makes it possible to reduce the number of operations required to form a part, and will permit some operations that are not usually possible on the conventional press. No complicated electrical, mechanical, or hydraulic arrangements are used in the new machine. A simple, toggle-eccentric mechanism provides the high degree of efficiency. This drives the slide at an essentially uniform rate during a possible 18-inch down stroke with no acceleration irregularities and at a much increased rate during the up stroke. Thus fewer rejects result.

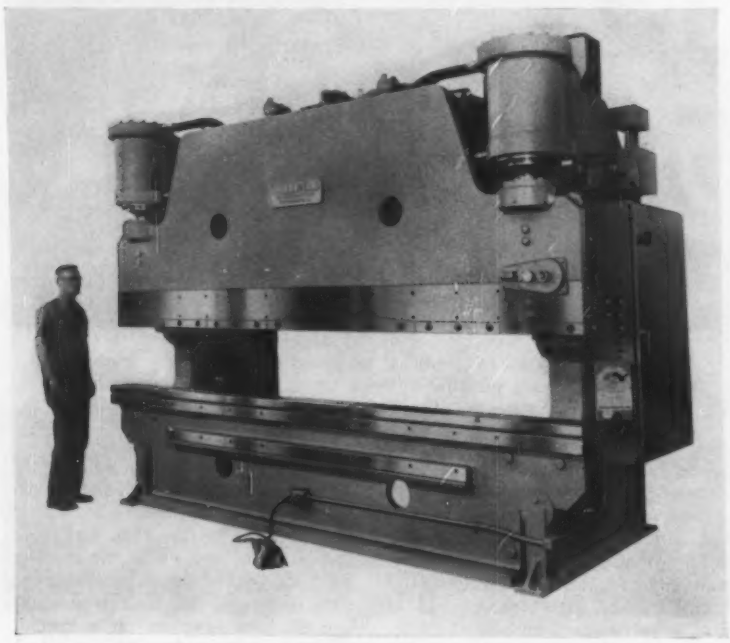


Fig. 3. Hydraulic power components on Model IH12-10 press brake are conveniently removed as a package

The modified connection between eccentric and slide uses a full eccentric shaft of shorter throw than indicated by the length of stroke. As a result, the mid-point capacity is equal to 50 per cent of the regular rated capacity. Since presses for draw work are generally selected by mid-stroke tonnage, this means that a smaller press than normally required can be used for a given job.

Speed-Draw presses are available with one-, two- or four-point suspension and for single and double action. The machine to be exhibited will be the two-point, single-action type with a slide area of 72 by 48 inches. Capacities of 200 tons (based on 3/4 inch from bottom of stroke) and up are available. Mid-stroke capacity of the machine is 50 per cent of full-load capacity. Standard bolster areas start with 30 by 36

Men Responsible for Results in the Machine Tool Using Industries

On this and following pages, MACHINERY pays tribute to some of the important men who apply the master tools of industry in the production of metal products on a scale that makes possible our high standard of living — men who will be vitally interested in the potentialities of the new equipment to be seen at the Machine Tool Show

R. H. Ruud, Exec. Vice-Pres., Los Angeles Div., North American Aviation, Inc., Los Angeles, Calif.

Lt. Gen. J. H. Hinrichs, Chief of Ordnance, Department of the Army, Washington, D.C.

Sherrod E. Skinner, Exec. Vice-President, General Motors Corporation, Detroit, Mich.

H. E. Rogers, Vice-President, Manufacturing, Hughes Tool Co., Houston, Texas.

R. G. LeTourneau, President, R. G. LeTourneau, Inc., Longview, Texas.

B. F. Anderson, Vice-Pres., Mfg., Remington Rand Div., Sperry Rand Corporation, New York, N. Y.

Men Responsible for Results in the Machine Tool Using Industries

Rear Admiral P. D. Stroop, U.S.N., Chief, Bureau of Naval Weapons, Department of the Navy, Washington.

A. Nelson, Asst. to Gen. Mgr., Hamilton Std. Div., United Aircraft Corp., Windsor Locks, Conn.

R. J. Schumann, Dir. of Mfg., Chrysler Airtemp Div. of Chrysler Corporation, Dayton, Ohio.

D. S. Haxton, Gen. Supt., Mfg. Fabr. & Assem., Rocketdyne Div., North American Aviation, Canoga Pk., Cal.

Carl A. Hand, Master Mechanic, John Deere Plow Works, Moline, Ill.

C. F. Herbold, Vice-President, Jack & Heintz, Inc., Cleveland, Ohio.

G. L. Runkle, Vice-President, Operations, Superior Coach Corporation, Lima, Ohio.

William J. Sparling, Vice-President, Chain Belt Co., Milwaukee, Wis.

J. R. Miller, Vice-President, Manufacturing, Dana Corporation, Toledo, Ohio.

Men Responsible for Results in the Machine Tool Using Industries

Harold E. Tulloch, Manufacturing Superintendent, Royal McBee Corporation, Hartford, Conn.

W. H. Doerfner, Gen. Mgr., Saginaw Steering Gear Div., General Motors Corp., Saginaw, Mich.

R. J. Anderson, Vice-President & Factory Manager, Webster Electric Co., Racine, Wis.

E. S. Mathiesen, Vice-President in Charge of Mfg., Cutler-Hammer, Milwaukee, Wis.

R. J. Ackerman, Wks. Mgr., Cadillac Motor Car Div., General Motors Corporation, Detroit, Mich.

Howard G. Grim, Vice-President, Manufacturing, Heppenstall Co., Pittsburgh, Pa.

W. M. Reese, Chief, Mfg. Branch, Tech. Shops Div., U. S. Naval Ordnance Lab., Silver Spring, Md.

Dr. Wendell B. Sell, Vice-Pres. & Gen. Mgr., The Marquardt Corporation, Pomona, Calif.

E. H. Kelley, Gen. Mfg. Manager, Chevrolet Motor Div., General Motors Corp., Detroit, Mich.

Men Responsible for Results in the Machine Tool Using Industries

B. H. Sibley, Vice-President, Manufacturing, Champion Spark Plug Co., Toledo, Ohio.

E. C. MacCormac, V. P. & Wks. Mgr., Sperry Farragut Co., Div. of Sperry Rand Corp., Bristol, Tenn.

O. Wm. Habel, Gen. Mgr., Detroit Transmission Div., General Motors Corp., Ypsilanti, Mich.

W. P. Uhler, V. P. Chg. Prod., S. S. White Dental Mfg. Co., Prince Bay, Staten Island, N. Y.

H. E. Chesebrough, Vice-Pres. Chrysler Corp., and Gen. Mgr. Plymouth-DeSoto-Valiant Div., Detroit, Mich.

C. J. Werner, General Manager, GMC Truck & Coach Div., Genetal Motors Corp., Pontiac, Mich.

Andrew F. Haiduck, Group Vice-President, Lear, Inc., Grand Rapids, Michigan

E. P. Hancock, Vice-President, Intercontinental Manufacturing Co., Inc., Garland, Texas.

C. B. Gracey, Vice-Pres. & Gen. Mgr., Wichita Div., Boeing Airplane Co., Wichita, Kans.

inch and standard slide areas, with 30 by 30 inch and range upward.

Other equipment to be shown is a 160-ton mechanical press brake, Model H3 1/2-10 (Fig. 1), which features a high-torque, continuous-duty punch press motor, a motor-adjusted ram made from a solid steel slab, and an 18-inch depth of throat. Both ends of the machine have overload protection. Ram gibbing is automatic wear-compensating. There is also an unusual near-bottom stroke stop.

Representative of the company's line of mechanical shears will be a 300-ton version of Model 8D-12 arranged for slitting and notching, Fig. 2. This machine has rugged, dependable spring hold-downs that are quiet, and slitting adjustment mounted on the blade itself. It has the company's Micro-set knife adjustment controlled from the front of the machine, and the digital indicator for the back gage also at the front.

The hydraulic press brakes in the line will be represented by a 200-ton version of Model IH12-10, Fig. 3, which cannot be overloaded. Regardless of the size of plate put into this press, it cannot be damaged. Only the ram will stop, and it can be backed away immediately. Power is constant during the entire 12-inch stroke. The ram may be started, stopped, and reversed at any point. It need not continue through a complete cycle; thus permitting inching of the ram to the work and backing it away wherever desired.

Circle 579 on Readers' Service Card

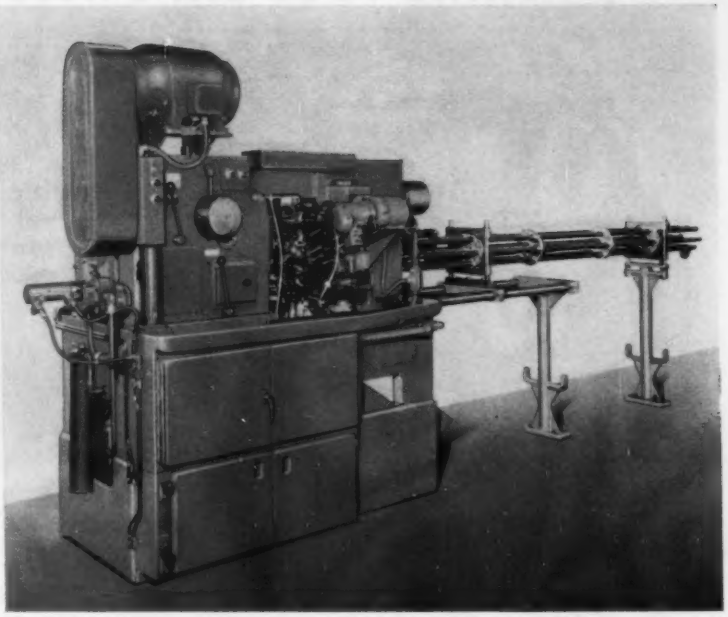


Fig. 1. Stop-spindle automatic lathe Model QF offers cost-saving opportunities to eliminate second operations through its ability to do cross-drilling and cross-milling

Ingenious New Tooling Demonstrates Versatility of Production Lathes

Booth 1225

A display and demonstration of the latest ideas in automatic turning will keynote the exhibit of Cone Automatic Machine Co., Inc., Windsor, Vt. The QF (Fig. 1) is the stop-spindle version of the standard constant-drive six-spindle QE bar Conomatic. The stop-spindle mechanism permits use of auxiliary attachments for cross-milling, cross-drilling, and numerous operations that would otherwise require the greater costs and time of a second handling. The recommended maximum speed of the QF is 3500 work-spindle rpm; the recommended maximum speed of the QE is 5259 rpm.

The Conomatic Pilot lathe, Model KU-10 (Fig. 2), that will be in operation is one of several models of multiple-cycling automatic copying lathes built and marketed by Cone in the United States, under rights granted by H. Ernault-Batignolles of France. This machine will demonstrate productive and flexible applications at Chicago in the machining of a heavy tractor axle, using carbide tools at heavy feeds. The versatile design of these lathes permits wide productive individuality in tooling. A notable example is the ability of the machine to completely copy-turn a part, including straight shoulders on either right or left sides, or both. Also, two independent slides operating in either direction are provided for front and rear tooling.

Circle 580 on Readers' Service Card

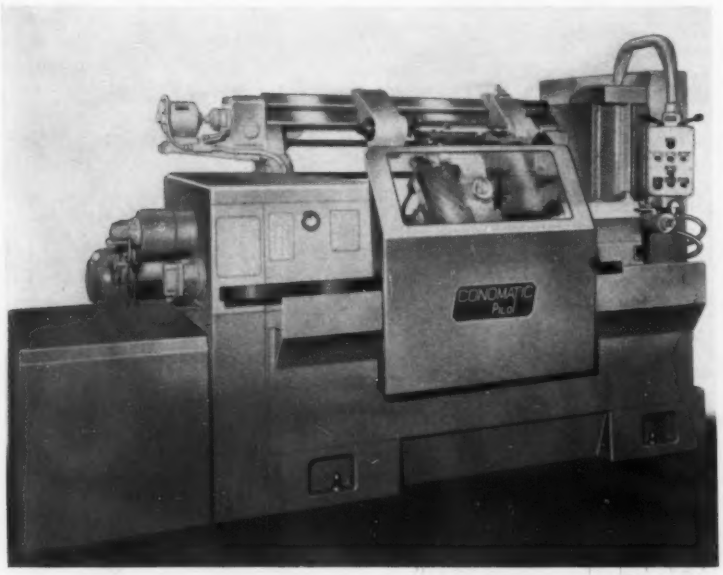


Fig. 2. Automatic copying lathe in the Cone booth will be tooled with carbide for a one-pass turning of a heavy axle forging at heavy feeds

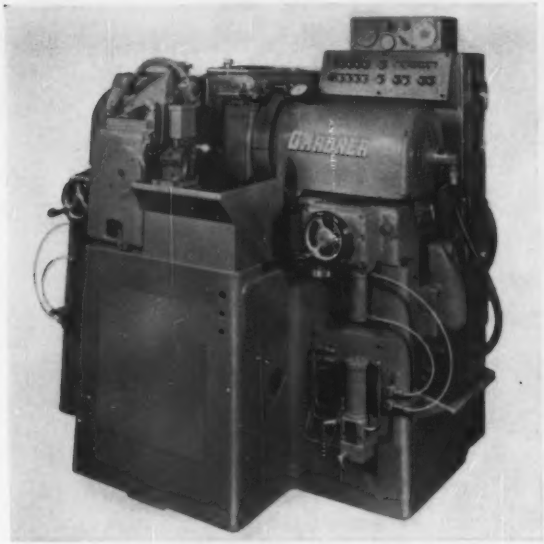


Fig. 1. Gardner 2H10 double horizontal spindle disc grinder for small parts

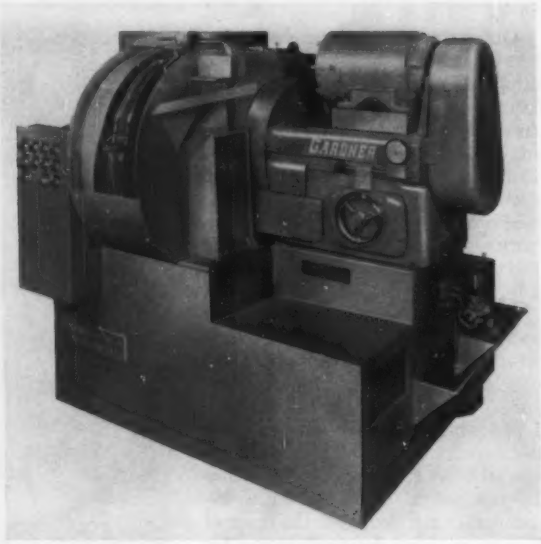


Fig. 2. Fully automatic Gardner 1H20 single horizontal spindle disc grinder

Gardner Automatic Double Disc Grinders

Booth 823

Seven new or improved precision disc grinders will be demonstrated in operation by the Gardner Machine Co., Beloit, Wis. Six of the machines employ two abrasive discs to simultaneously grind opposed faces of work-pieces parallel. Automatic functioning is accented and special automation features include loading of work-pieces into a carrier, dressing of the abrasive discs, gaging of parts and adjusting of the machine to maintain tolerances, and work-piece positioning and discharge. Three of the grinders are completely automated.

The new 2H10 double horizontal disc grinder shown in Fig. 1 is fully automatic except for disc dressing. It can grind opposing faces of small parts, such as instrument bearing races, parallel to within 0.000025 inch at the rate of 5000 to 6000 pieces per hour. An ultrafine, automatic power abrasive feed in 0.0000-25-inch increments is provided which is actuated during grinding by a postprocess machine control sizing gage. A dial indicator on each head shows the amount of head feed movement, and separate indicators show the remaining amount of usable abrasive. A 5-hp motor drives each of the machine's two 15-inch diameter discs. Work-pieces are inserted in a rotary circular carrier by a device automatically transferring them from a hopper-feeder. After grinding, an automatic ejector discharges the pieces. Wet grinding is possible with the machine, which has a coolant pump and magnetic separator. Coolant is circulated through both spindles.

A 1H20 single horizontal spindle disc grinder, Fig. 2, will also be introduced. Fully automatic, this machine has one abrasive disc, and can be used to grind the stem end of internal combustion engine valves flat and square with the stem at a rate of 2400 per hour. The abrasive disc has a 23-inch diameter, a usable thickness of 3 inches, and is driven by a 10-hp motor. Cam-actuated, reed-mounted automatic clamps hold work-pieces, and V-blocks at each station are carbide-faced. In-process airjet gaging of the abrasive disc face actuates electrical control of the

Fig. 3. Roller bearing ends will be ground on this Gardner 2H20 double horizontal spindle disc grinder

abrasive feed, which can also be operated by push-button. The power feed acts in minimum increments of 0.0001 inch, and a dial indicator shows all head feed movement. Disc face alignment, without removing the disc, is permitted by a gage-plate at the end of the slide. For leveling and stability, full machine weight rests on three points.

The 2H20 double horizontal spindle disc grinder, Fig. 3, another fully automatic machine, will also be demonstrated. Opposed ends of bearing rollers have been ground on this equipment parallel to within 0.0001 inch, and square with the outer surface to within 0.0001 inch, at the rate of 12,000 to 15,000 pieces per hour. The grinder is used for small-to-medium sized parts. Maximum work-piece width is 4 inches. Automatic dressing of the abrasive discs can be installed as original equipment or added later. After grinding, the work-pieces move through a machine control trend sizing gage. When the gage shows pieces nearing the high side of tolerance, the automatic feed mechanism advances the discs alternately to compensate for abrasive wear. Work-pieces are ejected by a coolant jet. A dial indicator for each head shows feed movement and zeroing gages check head alignment. Other features are a centralized lubrication system and separate coarse and fine hand feed handwheels. Power increment feed is electropneumatic.

Another machine to be shown is the 2H40 double horizontal spindle disc grinder seen in Fig. 4. Fully automatic except for manual trough-feeder loading of work-pieces, this equipment grinds the unequal opposed sides of work-pieces parallel.

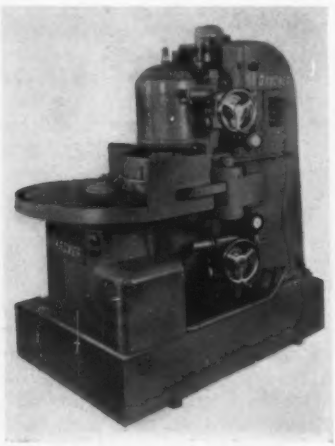


Fig. 5. Gardner 2V18 vertical double-spindle disc grinder

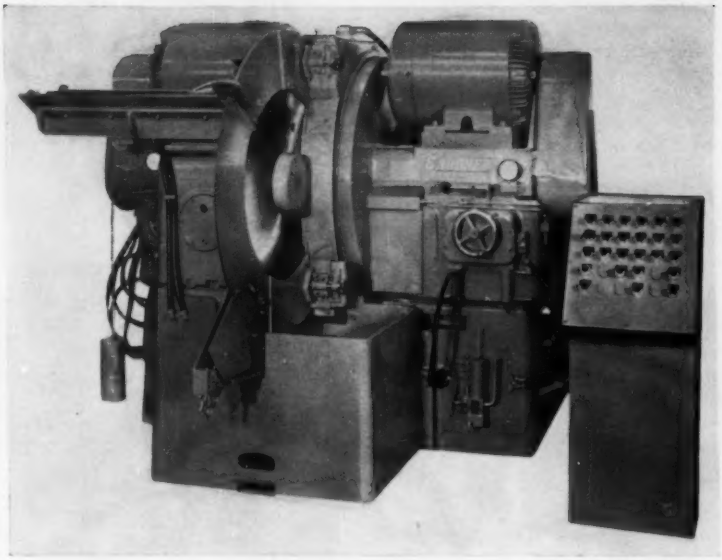


Fig. 4. Model 2H40 double horizontal spindle disc grinder to be demonstrated on large parts

It will be demonstrated grinding the unequal sides of aluminum servo-accumulator covers parallel. Two hundred of these parts can be processed hourly to flatness tolerances of 0.0005 to 0.001 inch. Stock removal on each side is 0.030 inch. A face-cutting mechanism is synchronized with the carrier which handles work-pieces up to 4 inches wide. A ram type ejector removes ground pieces which are automatically stacked. Discs can be changed, without disturbing setup and dressing is done automatically, after a predetermined number of cycles. Air-operated power feeds with standard increments of 0.0001 inch advance the abrasive discs. The coolant system can be integral, external, or internal.

Except for work loading and disc dressing, the 2V18 vertical double-spindle disc grinder seen in Fig. 5 is also automatic. Features of the machine are a new, power-operated increment feed for both heads and a portable control station for the power feed. The control station secures to the machine by a permanent magnet, and can be located to suit the operator. Compound angular adjustment for different setups is eliminated by having the head tilt in one plane only. The grinder's two 18-inch abrasive discs are driven by 10-hp motors. Work-pieces are hand loaded into a rotary carrier with a variable speed drive in a 1/8- to 1 3/4-rpm range and are discharged by gravity. A selector switch controls advances of either head selectively in 0.0005-inch minimum and 0.003-inch maximum increments. The machine is adaptable for multiple-grinding, with a slide-out plate at the discharge chute available for progressive grinding operations.

Circle 581 on Readers' Service Card

Standard Electrical Tool Exhibits Versatile Line

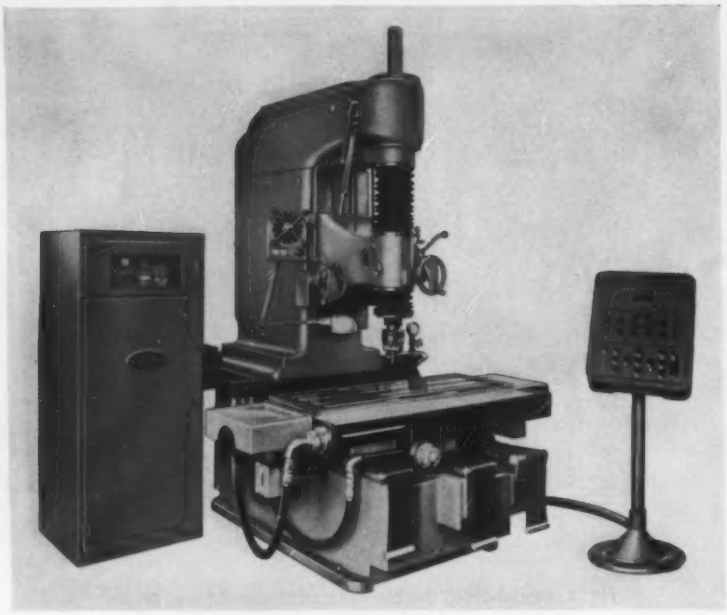
Booth 1450

Superprecision spindles, single and compound feeds, and accessories—including micrometer dials, swivel work and/or mounting bases, accordion protectors, wheel holders, and wheel guards—will be among the extensive line of machine tool accessories and components to be exhibited by the Standard Electric Tool Co., Cincinnati, Ohio. These individual items will also be shown in combination assemblies to identify the building-block features developed to suit specific production problems.

The superprecision spindles are designed for production operations such as grinding, boring, drilling, milling, routing, and electrolytic metal removal. In addition, there is a line of work-heads for all conventional types of chucking equipment.

Spindle capacities range from 1/4 to 200 hp. The design of motorized spindles includes totally enclosed nonventilated, fan-cooled, liquid-cooled, and high-frequency types. Wheel guards are designed in accordance with the Safety Code of American Standards Association.

Circle 582 on Readers' Service Card



Knight jig borer incorporates Sperry tape control

Tape-Controlled Jig Borer

Booth 824

W. B. Knight Machinery Co., St. Louis, Mo., will show a Model 65 jig borer equipped with a Sperry control which reads tape by low-pressure air. An entire block of tape containing all necessary information for a given position is read simultaneously, so no memory system is needed. Reading of the tape and response of the machine are so fast as to appear instantaneous. One-inch wide, eight-channel tape is used, with provisions for auxiliary functions.

Table and saddle are driven and clamped hydraulically, simultaneously reaching required positions. Precision linear transducers assure positioning accuracy. No wear of the transducers can occur since electric signals give the location of the slides without physical contact. The machine is equipped for both tape and manual dial input, with push-buttons for rapid traverse.

Circle 583 on Readers' Service Card

Edlund-Matic layout drilling machine with numerical control is equipped for both tape and dial input

Edlund Layout Drilling Machine

Booth 531

The Edlund-Matic—a layout drilling machine with numerical control—will be introduced by the Edlund Machinery Co., Cortland, N. Y. It was designed for both tape and dial input, plus a wide variety of operations, and for speed in setup. This numerically controlled drilling and tapping machine (illustrated here) can perform multiple operations in single piece layout work or short run production. Its design minimizes the need for operator attendance; an entire sequence of nine operations can be set up and repeated. Initial setups of the machine are made through knobs; the speed and feed are always indicated on direct reading dials.

Features such as automatic speed and feed changes, and the spindle travel changes, are accomplished by simple mechanical or electrical means. Tool changes are made by the operator. Stops may be set for one operation at a time during the machining of the first work-piece. A feed jog button is provided to move the spindle down slowly while making these settings.

After setup and a part is in place on the Edlund compound table, the operator places a previously pre-

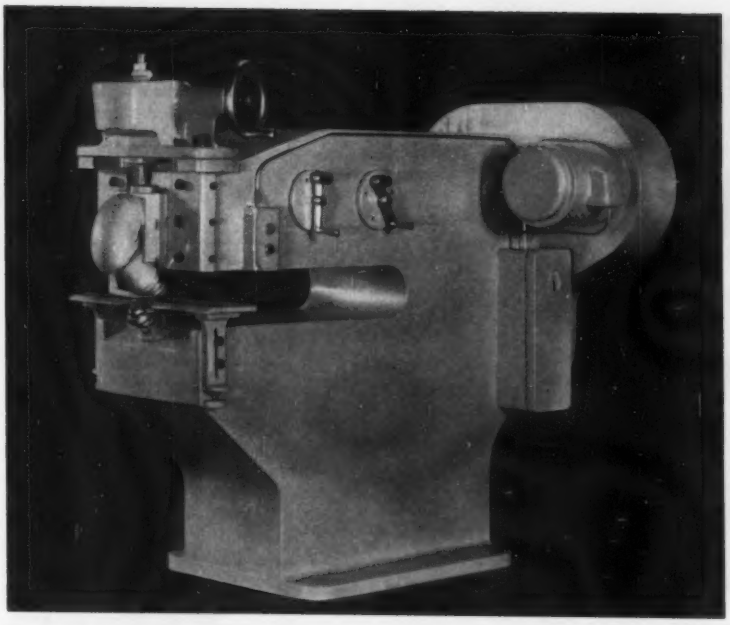


Fig. 1. Beatty-Quickwork rotary shear handles 1/4-inch thick mild steel

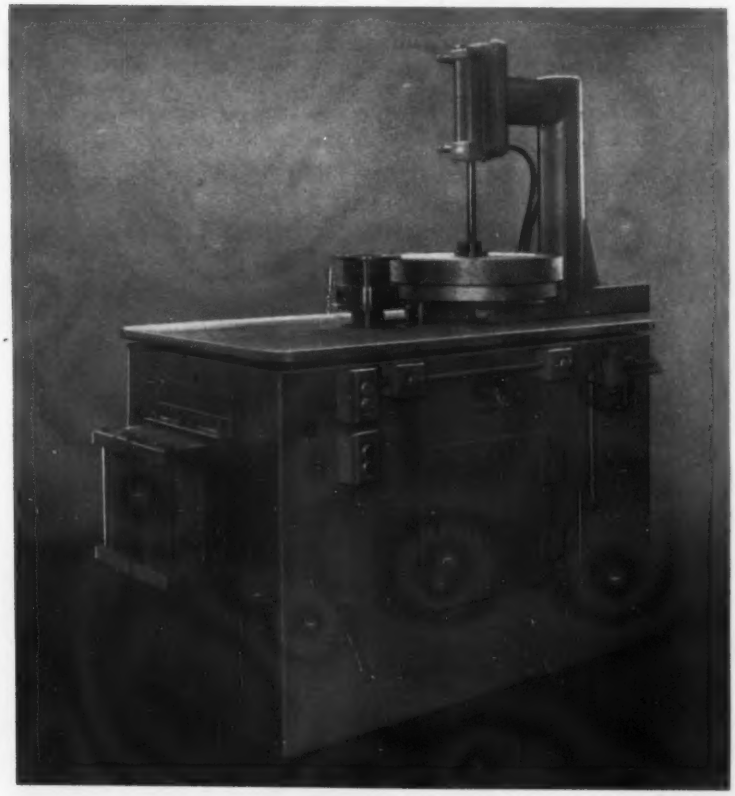


Fig. 2. Stamping trimmer, shown with pneumatic hold-down device, has a capacity of 3/16 inch in mild steel

pared tape in the numerical tape reader and presses a button to start the machine cycle. The table will then move to position and the spindle feed cycle is initiated. If other operations using the same tool and depth settings are desired the table will continue to position as required and repeat the cycle. When the tape calls for a new operation involving a new tool, different depth control settings, speed and feed changes, an indicating light designates the number of the tool to be placed in the spindle. The spindle automatically stops for the operator to change tools. Speed and feed changes are made automatically. The feed mechanism is of the infinitely variable type and is engaged by a magnetic clutch. A dial potentiometer indicates the feed rates.

Capacity of the machine is 1 inch in cast iron and 7/8 inch in mild steel. The spindle nose has a No. 5 male Jacobs taper with a draw type screw for locking the tool-holder in place. Spindle travel is 7 inches; sliding arm, 10 inches. Spindle quill diameter measures 3/16 inch. Spindle speeds are infinitely variable within the standard speed range of 225-2700 rpm; spindle feeds range from 1 to 7 inches per minute. The distance from tool-holder to compound table is a minimum of 5 3/4 inches, a maximum of 22 3/4 inches.

Circle 584 on Readers' Service Card

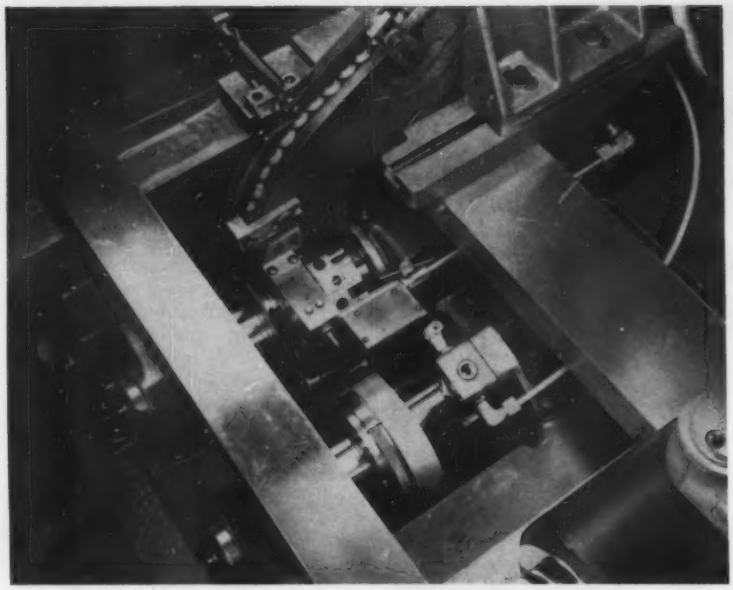
Beatty Rotary Shear and Stamping Trimmer

Booth 243

Two machines will be exhibited by the Beatty Machine & Mfg. Co. of Hammond, Ind. A model 25A Beatty-Quickwork rotary shear, Fig. 1, is of welded construction and has a shearing capacity of 1/4 inch in mild steel, with a throat depth of 36 inches. There are three cutting speeds: 8, 14, and 20 fpm. The upper cutter-head can be operated through a worm-drive and handwheel, or a motorized drive can be substituted.

A Model 43HVX Beatty-Quickwork trimmer, Fig. 2, has the capacity to shear mild-steel stampings up to 3/16 inch thick. The pneumatic hold-down device shown on the table top is generally used for trimming round stampings. Any of the company's machines can be adapted for trimming rectangular or odd-shaped stampings having inside corner radii as small as 3/8 inch.

Circle 585 on Readers' Service Card



Close-up of threading and knurling setup on Lanhyrol thread rolling equipment

Landis Thread Rolling and Cutting Machines

Booth 432

The Landis Machine Co., Waynesboro, Pa., will display eleven thread cutting and rolling machines in operation. Equipment to be shown will include Lanhyrol and Lan-Nu-Rol thread rolling machines, Landmaco thread cutting machines, an automatic coupling tapping machine, and a four-spindle semi-automatic threading machine. The thread rolling equipment will be featured at the exhibit with ten different jobs being demonstrated. Two thread rolling machines—a Lanhyrol and a Lan-Nu-Rol—will be introduced at the Exposition.

The new Lanhyrol machine has a diameter range up to 3 inches and is designed to both automatically thread and knurl in one pass at rates up to 100 parts per minute. It is completely automatic, with only visual inspection being required. The machine, as shown in the illustration, is equipped with dies having a threaded section and a knurled section on the die circumference. Both operations are thus completed in one revolution of the spindles. The equipment will be demonstrated producing 5/8-inch diameter, 18-pitch threads and a thirty-two-tooth, 120-degree knurl at the same time in a single rolling operation on a headed part.

The Lan-Nu-Rol machine has a 2-inch maximum infeed rolling capacity and a 1-inch maximum through-feed rolling capacity. It will be displayed with a rod feeder and receiver unit designed to allow automatic through-feed rolling of rod length stock.

The work-piece to be demonstrated on this equipment will be a 5/8-inch diameter, 11-pitch rod 3 feet long. Although the machine will be equipped with a rod feeder and receiver having a length capacity of 4 feet, units for handling rods up to 20 feet are available.

Circle 586 on Readers' Service Card

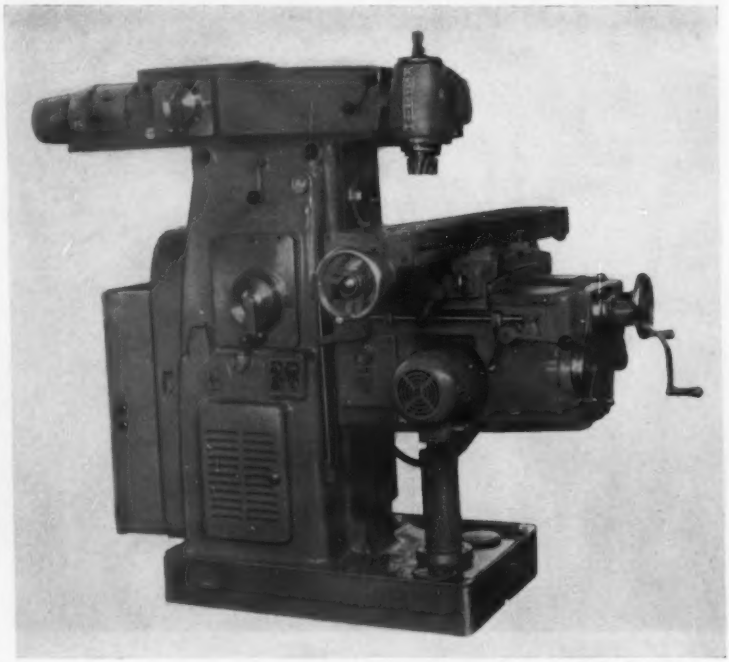
Kempsmith Master-Mill Gets Motorized Ram

Booth 347

Kempsmith Machine Co., Milwaukee, Wis., will exhibit a motorized ram which adapts its Master-Mill for vertical and angular milling. The ram is driven by a 3 hp motor. Electrical controls, duplicated front and rear, permit either independent operation of the ram-head attachments or coordinated operation with the machine spindle.

Eight speeds, from 50 to 2250 rpm, can be obtained through a dial selector. Other features are worm-wheel adjustment, pressure lubrication, an electromagnetic brake, and a No. 50 National Standard spindle taper. The ram can be adapted to any Master-Mill in the field. The basic milling machine itself has a new, totally enclosed knee-elevating screw running in oil.

Circle 587 on Readers' Service Card



Master-Mill ram has own motor

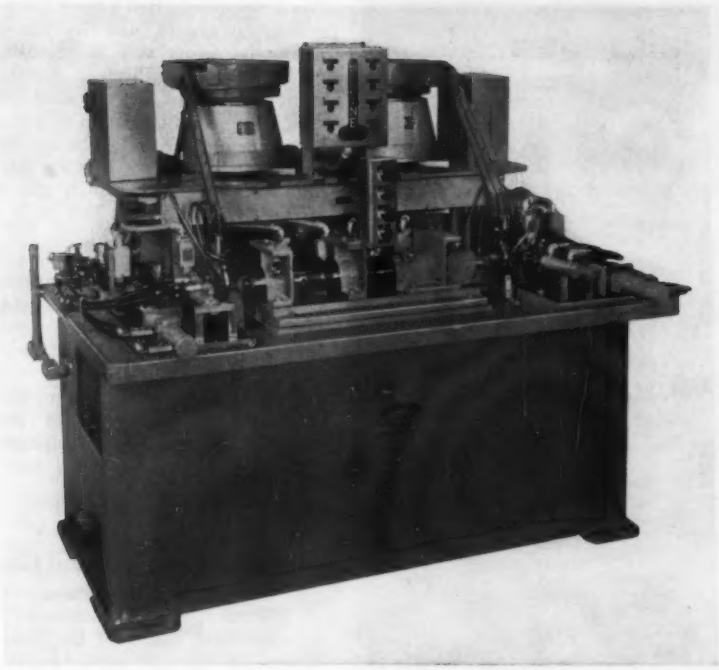


Fig. 1. A single lead-screw spindle taps nuts at either end in Bodine's new double-end continuous tapper

Tapper and Building-Block Special Shown by Bodine

Booth 828

Model 58 double-end continuous tapper, Fig. 1, will be one of the two new machines featured in the exhibit of the Bodine Corporation, Bridgeport, Conn. Essentially a lead-screw spindle with tap-holders on each end, the spindle is taps on one end while withdrawing at the other. Thus practically all motions are productive. The spindle is driven by a heavy-duty, high-reversal motor specially designed for this machine.

Electrically, the tapper has direct-current braking for reversal and is completely interlocked to prevent damage to the spindle or tooling. Plug-in type limit switches (for minimum maintenance down time) check for complete index, clamping pressure, and failure of spindle-stop switches or air pressure. Any malfunctions stop the spindle and a "trouble light" on the panel indicates the location of the failure. Completely automatic, the machine on display will be tapping T-nuts. These nuts come to the machine as cylindrical shapes having flanges which are shaped into prongs, or dimpled for welding, after tapping.

The second machine to be featured at the Exposition is one of Bodine's four standard chassis, a Model 41-20 machine, Fig. 2, tooled to produce squeeze-type B-X connectors. It illustrates dramatically the ability to assemble a special machine from standard building units. The machine base, the spindle equipment, the screw feeding unit, and the air cylinder units are "off-the-shelf" items.

The operator loads a malleable casting into a nest type fixture. The top ear is drilled with a clearance drill; the bottom ear, tap-drilled and then tapped. A screw is then inserted and driven through the first ear into the second. Next, an inspection probe checks to see if the screw is in proper position. The part is then clamped into the nest, and a slot is milled on the top ear to permit flexing of the ear when clamping the cable. At the next station, the screw is staked to prevent it from coming out in the subsequent plating operation. Finally, the completed part is automatically ejected. The machine, running at twenty-five strokes per minute, performs 8750 separate operations and completes 1250 pieces per fifty-minute hour.

Circle 588 on Readers' Service Card

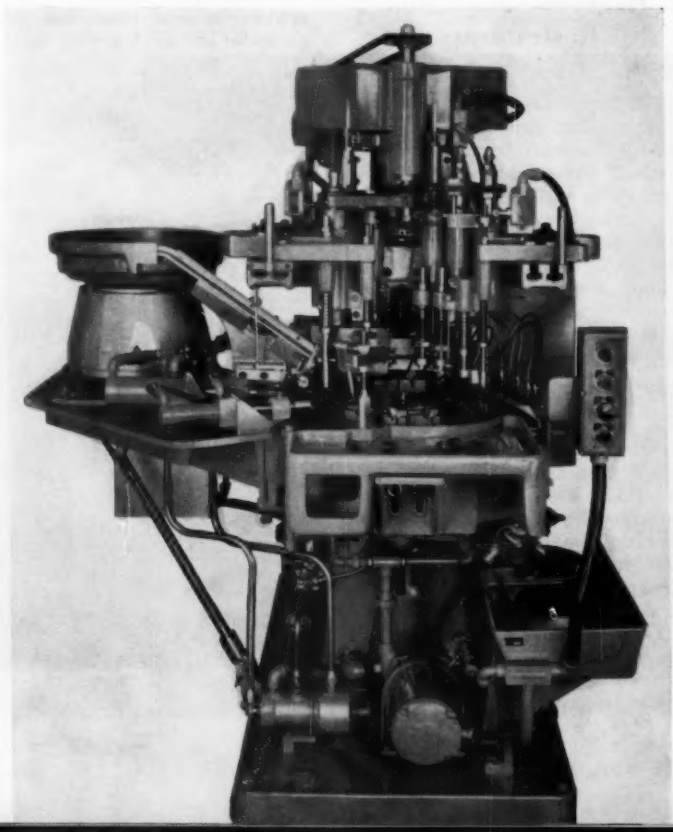
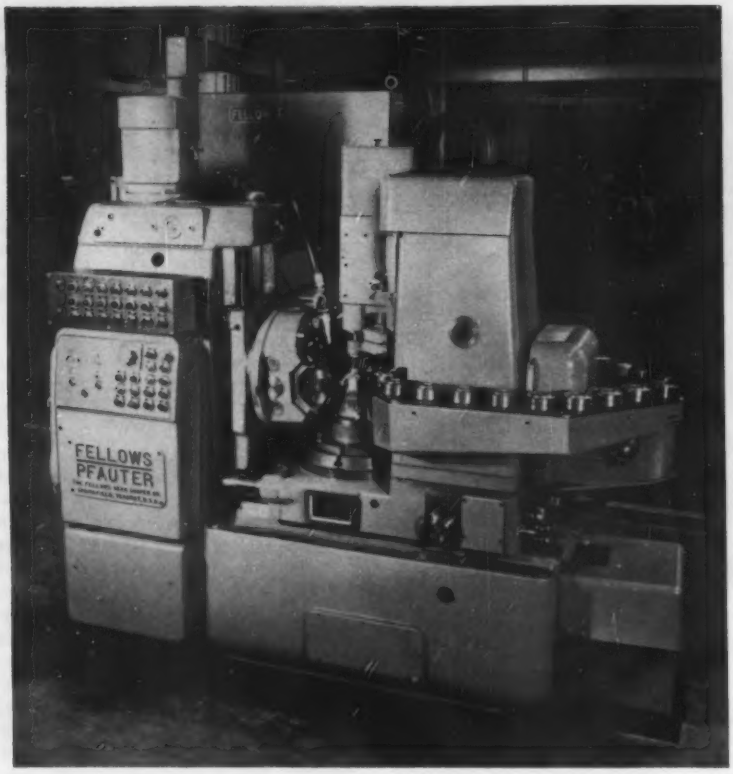


Fig. 2. Off-the-shelf building blocks are assembled into a special machine for production of B-X cable fittings



Automatic blank loading and conversion to the English measuring adapt the P 400 Fellows-Pfauter gear hobber for domestic use

Fellows Gear Shapers and Hobbers—Inspection Instruments

Booth 929

The first American-built Fellows-Pfauter hobbing machine (illustration) will be operating in the exhibit of the Fellows Gear Shaper Co. of Springfield, Vt. Model P 400 is basically the European prototype adapted to the English measurement system. Also it is equipped for automatic loading of work. A Fellows-Reishauer gear grinder similarly equipped for American production techniques will be shown. It includes improvements in numerous mechanical details.

In addition the display will have two late model gear shapers and a helical gear cutter sharpening machine. The latter features combined mechanized, hydraulic grinding wheel feed and an automatic wheel form dresser. The resulting helical cutter sharpener will handle the needs of a volume user of helical gear cutters in a high-production industry.

Seven of nine gear measuring instruments on display have electronic recording equipment. The two without recorders are small, bench type center distance measuring instruments for fine-pitch gears. One of the No. 4 fine-pitch "Red Liners," makes composite checks and records dimensional errors at a magnification of 1600 to 1. Another No. 4 instrument is arranged for checking with a single convolution worm at a magnification of 800 to 1. The involute measuring instrument on view has a high-speed recorder which can be operated at 250 to 1, 500 to 1 or 1000 to 1 magnification.

A lead measuring instrument with a high-speed recorder, magnifying at 500 to 1, will be demonstrated, and a tooth index measuring instrument and a Model 20M "Red Liner" with an electronic recorder.

The Fellows exhibit represents an unusually broad line of gear cutting and measuring equipment.

Circle 589 on Readers' Service Card

Bryant to Introduce Universal, Internal, and Cam Grinding Machines

Booth 936

The Bryant Chucking Grinder Co., Springfield, Vt., will introduce a universal internal grinder and demonstrate two Centalign internal grinders, a vertical Centalign cam grinder, and two miniature Centalign internal grinders. The universal grinder (Fig. 1) is a general purpose machine for internal and external cylindrical grinding and internal face and rotary face grinding. Swing inside the standard chuck guard is 12 inches, with the maxi-

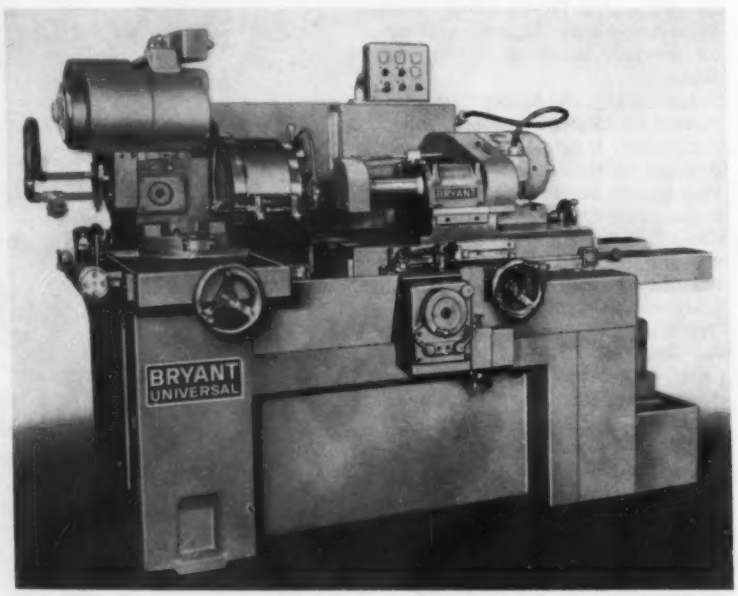


Fig. 1. Bryant universal internal grinder

mum grinding stroke being 16 inches. New features include a compound wheel-slide construction which places the traverse slide above the cross-slide. This allows the use of feed controls which do not reciprocate. A complete line of machine accessories is available, including a micrometer attachment for setting taper. This eliminates the need for gage block combinations for each angle desired.

The Centalign internal grinder, Fig. 2, features an exclusive wheel-slide construction, and cycle control by programming cams. At the Exposition, one machine will automatically grind universal joint bearings, while the other will automatically grind tapered roller bearing cones. Shoe centerless tooling for quick change-over from one job to another will be used to handle the tapered roller bearing cones. The universal joint bearings will be held by a diaphragm chuck.

The vertical cam grinder, Fig. 3, is designed to speed production of contoured bores through the operation of the eccentric work-holding fixture in a horizontal plane. It will be demonstrated by the production grinding of pump ring bores. In the case of the miniature internal grinders, Fig. 4, one machine will be used to grind bores and the other will demonstrate the grinding of raceways of miniature bearings. These machines feature a disc drive work-head, and quick-change "packaged tooling." Another feature is a mechanism which automatically dresses the extremely small wheels used. Floor space occupied by each of these miniature grinders is only 8 1/4 square feet.

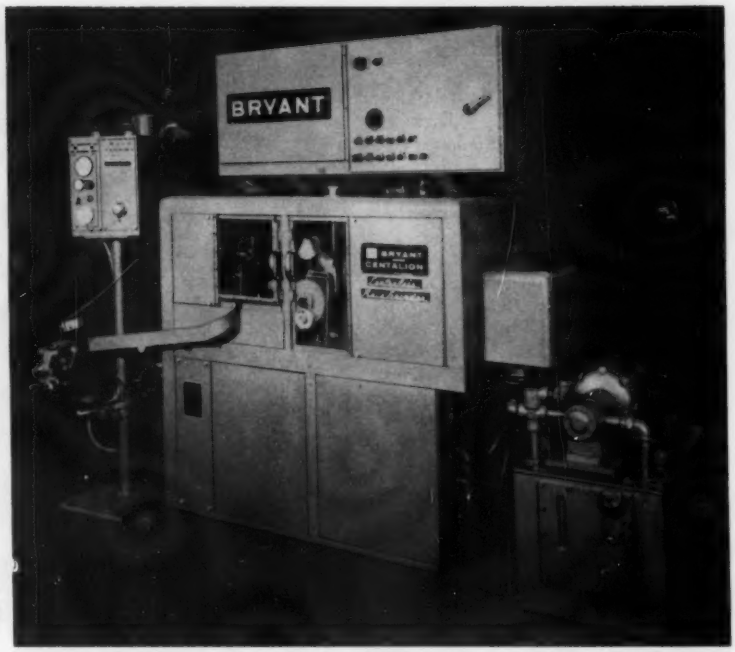


Fig. 2. Centalign internal grinder with compound wheel-slide to be shown by Bryant Chucking Grinder Co.

Circle 590 on Readers' Service Card

Fig. 3. Bryant vertical cam grinder

Fig. 4. Miniature Centalign internal grinder

Gisholt Superfinishers, Lathes, and Balancers

Booth 1042

Gisholt Machine Co., Madison, Wis., will demonstrate machines representing every type of equipment that the company is currently building. Featured at the exhibit will be a Factrol 101 turret lathe (Fig. 1) with continuous-path (analog) magnetic tape control. With a tape recorder, a turret lathe operator can make his own tapes after a short period of instruction.

The Factrol lathe will be set up to machine intricate contour and step work on difficult parts. Visitors will be allowed to push the start button and watch the machine perform. All tools on the hex turret and cross-slide carriages are capable of contouring. The machine uses standard tools and a wide variety of work can be done with a minimum of tooling. The tape recorder will be shown and Factrol tapes will be prepared during the Exposition.

Fig. 1. Gisholt Factrol 101 turret lathe with continuous-path magnetic tape control

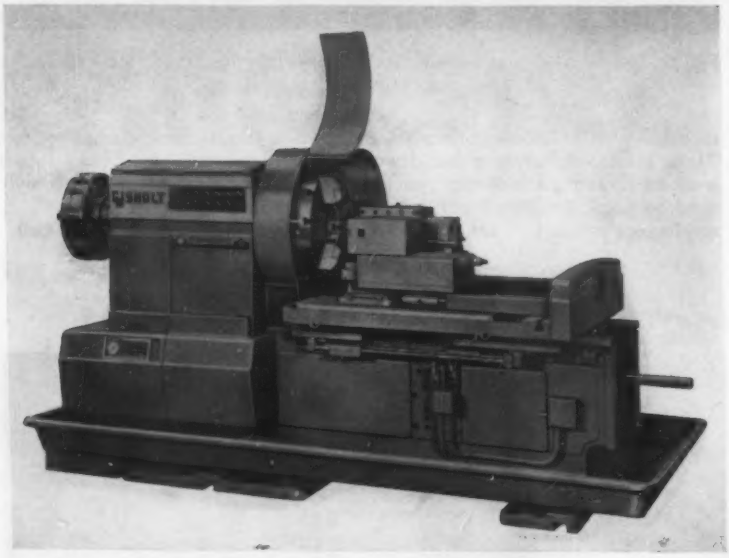


Fig. 2. Masterline Simplimatic, a single-spindle automatic production chucking lathe built by Gisholt

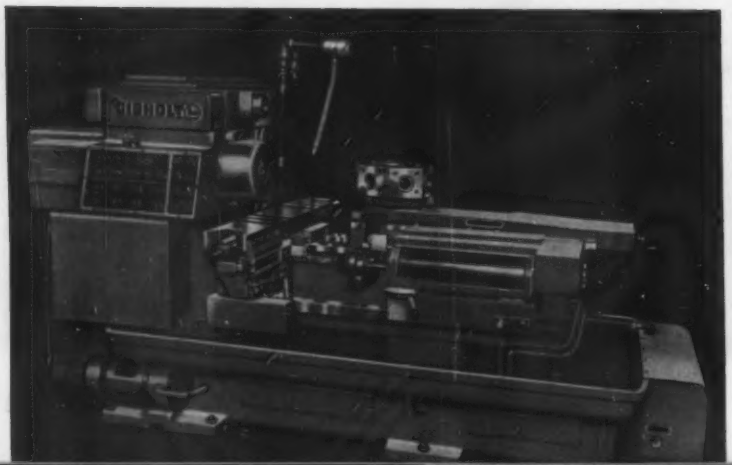


Fig. 3. Gisholt Masterline 5AR automatic ram type turret lathe to be introduced at the Exposition

Also to be introduced is a Masterline 1F Fastermatic automatic chucking turret lathe with punched paper tape control and using the Westinghouse PRODAC control system. This is a program digital (point-to-point) automatic control comprising logic, scanning, and control of such functions as speed and feed selection and program sequence direction. A closed-loop punched paper tape is used and provision is made for manual, check and automatic operation. The machine will be demonstrated machining cast-iron clutch hubs, with two operations being completed on each index of the hexagon turret. Featured are a two-speed motor and cross-slide tool relief.

The Masterline 3F Fastermatic automatic chucking turret lathe (announced in MACHINERY, May, 1960, page 169) with FeeDial control will be shown for the first time. Featuring individually selected feeds for each tooling station, the machine will be tooled for first-operation machining of steel jackshaft forgings. A Masterline Simplimatic automatic chucking lathe (Fig. 2) will be shown set up to handle the second-operation machining on the same work-piece. Front, center, and rear independent slides will be used to handle a maximum number of surfaces in one chucking.

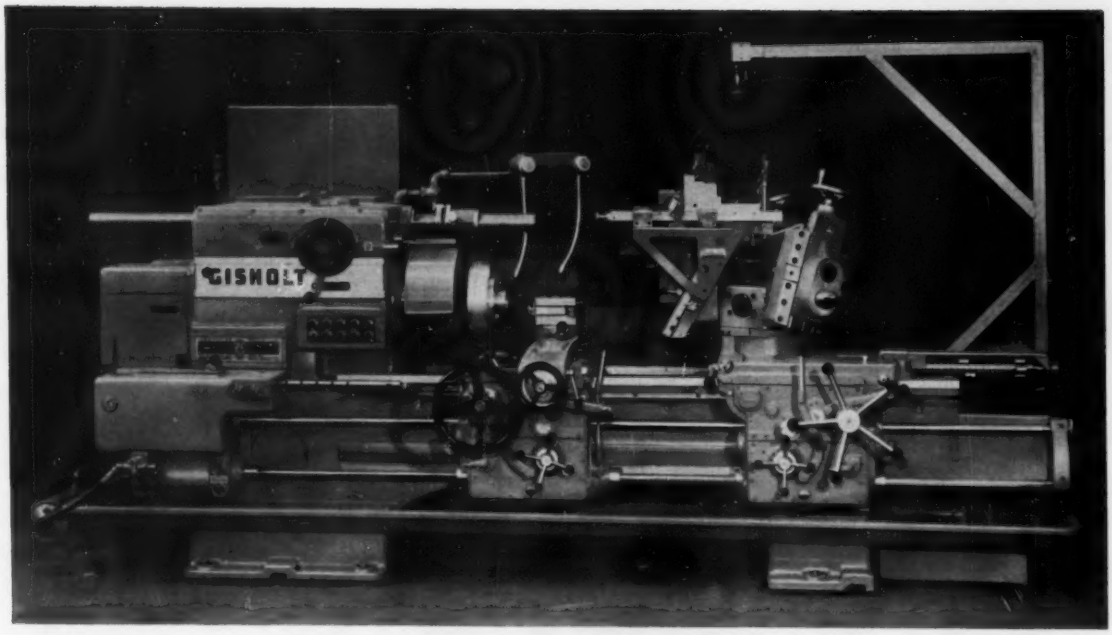


Fig. 4. Masterline 2L turret lathe with turret-mounted JETracer slide tool

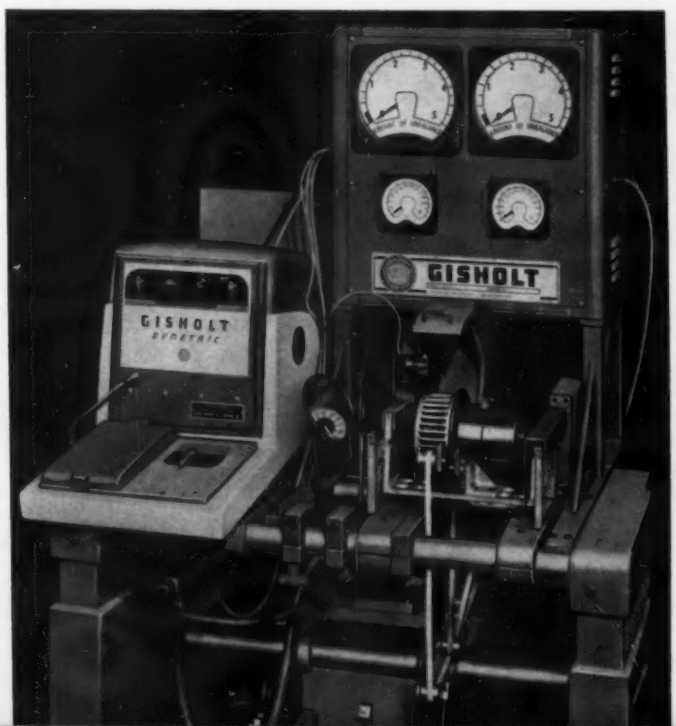
Masterline AR automatic ram type turret lathes will be introduced at the Exposition. These lathes can handle both bar and chucking work. Aside from cycle programming, no new machine setup procedures are employed and standard tools are used. Two Masterline 5AR turret lathes (Fig. 3) will be demonstrated, performing operations on 1-inch size valve bonnets. The first-operation machine will be equipped with a bar feed and will use a turret-mounted slide tool and an automatic recocking die-head. The entire cycle will be automatic, including cutoff. The second-operation machine will chuck the work. Also to be demonstrated is a Masterline No. 4 ram type turret lathe equipped with a JETracer attachment on the rear of a bridge type cross-slide.

A Masterline 2L saddle type turret lathe (Fig. 4) equipped with a twenty-four-speed headstock; 30-hp motor; 18-inch, three-jaw scroll chuck; and turret-mounted tracer slide tool will machine aluminum air cylinder bodies. The tracer slide tool will be used to finish the outside contour. In addition, a Masterline 3L saddle type turret lathe will be used to demonstrate the machining of 20-inch diameter cast-iron V-belt pulleys; and a 5L model of the same type machine will be set up for operations on 900-pound, 24-inch steel chuck bodies. Ceramic tools will be used for finish-turning and facing on the 5L size machine. All three saddle type turret lathes will have a new style apron with multiple-disc rapid-traverse clutches.

A Masterline No. 12 automatic chucking lathe will be displayed. This machine has multiple-diameter tracing and rapid change-over features. Machining on two different parts, a low-speed clutch shaft and an intermediate shaft, will be done. A four-pass automatic indexing JETracer on the front carriage will machine the steps, diameters, and contours; while necking, grooving, and chamfering will be completed by tools on the rear slide.

The general purpose Superfinisher, Masterline Model 51-B, will be

Fig. 5. Gisholt Type 1S balancing machine set up for balancing automatic blower assemblies



shown for the first time, demonstrating the automatic cycle operation on a variety of parts. This machine, which was announced in August MACHINERY, was specifically designed for superfinishing parts not requiring longitudinal traverse. It will be shown with automatic size control. A Masterline Model 81 single-spindle Superfinisher, also equipped with automatic size control, will be tooled to Superfinish flat ring faces. Newly redesigned, this machine can Superfinish flat, conical, or spherical surfaces and is equipped with an automatic cycle.

The company's Type 1S Balancer (Fig. 5) will be demonstrated balancing automotive blower assemblies. The machine will be equipped with separate unbalance location (angle) and amount meters, one set for each correction plane. These meters will be arranged to "hold" the readings until corrections are made. In addition, a Type 4U balancer will be shown with a large test rotor set up to demonstrate pure static (force) unbalance; pure dynamic (moment) unbalance; effective plane separation; and two-plane (static-dynamic) balancing.

Circle 591 on Readers' Service Card

Blanchard Surface Grinding Machines

Booth 1209

Included in the exhibit of the Blanchard Machine Co., Cambridge, Mass., will be two entirely new surface grinders. Model 18-A2, Fig. 1, is a two-spindle automatic unit featuring a "dry" base. In operation coolant and chips flow out of the grinder to an outside settling tank or central coolant system. The design of this grinder provides easy access to the grinding wheel area, and push-button stations and operator's control are conveniently located for ease of setup. A warning light flashes at the operator's station when wheels require replacing.

The grinder is equipped with 30-hp foot type spindle motors, a plain table for mounting special fixtures, and a six-speed gear-box for table rotation. For the Exposition, the table will have an eight-station fixture, each station handling a different work-piece. The table will be rotating to demonstrate clamping and unclamping of the fixtures, and to show the path of the work-pieces through the grinding wheels and under the wheel-control calipers.

Model 27-48 (Fig. 2), also of dry-base design, will have a conveyor type sludge tank mounted at its rear. An entirely new size of grinder, it has a 48-inch diameter magnetic chuck with a clearance of 52 inches inside the waterguards, a 12-inch vertical range, and a 27-inch segmented wheel. Coolant is directed both to the inside and outside of the wheel. A 75-hp motor powers the spindle.

Also on display will be the faceplate and spindle of a 100-hp surface grinder; some samples of glass, quartz, ceramic, and other material ground to fine finishes and extreme accuracy; and some of the company's abrasive wheels, wheel segments, segment chucks, and wheel holders.

Circle 592 on Readers' Service Card

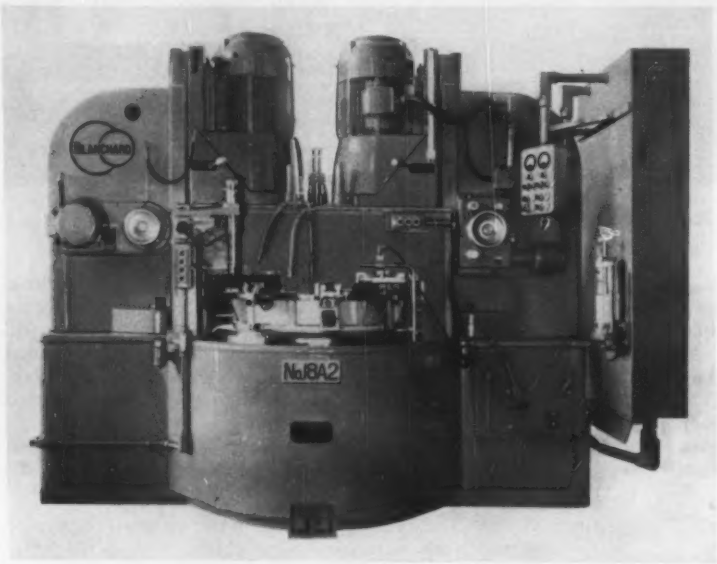


Fig. 1. (Above) Two-spindle automatic surface grinder with dry base

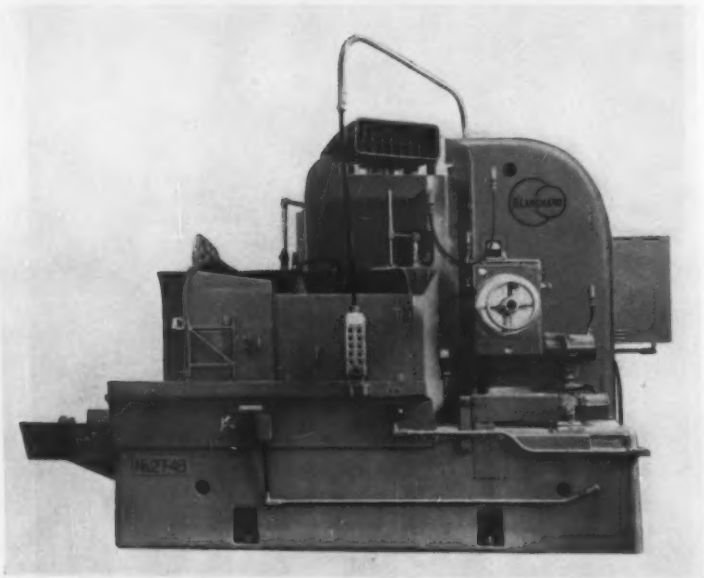


Fig. 2. (Left) New surface-grinder size has conveyor type sludge tank

Fig. 1. Reed B150 thread-rolling machine designed for 5-inch diameter infeed capacity

Fig. 2. Model A25 through-feed thread-rolling machine using the three-cylindrical-die principle

Reed Thread and Involute-Spline Rolling Machines

Booth 421

The Reed Rolled Thread Die Co., Holden, Mass., will display five additions to its line of cylindrical die thread and involute-spline rolling equipment. Two of these machines will be exhibited in actual production operations along with the Model B-111 for through-feed thread rolling and a Model A-22 for small lot thread rolling. Design innovations incorporated in these models include a spindle assembly adjustable for width of die face, a completely removable coolant system, large electrical control panel to accommodate extra circuits for electrically controlled work-handling equipment or feeding mechanisms, and a change-gear type drive system to give an extremely wide range of die speeds with positive drive. Several spindle units are available so that bearings with the correct radial die-load capacity may be used. The working height of the machines is standardized, making handling equipment readily adaptable.

The new cylindrical die machines include a Model B910, a two cylindrical die, general purpose threading machine that can operate at production rates in excess of 200 pieces per minute in a size range from 3/8 to 1 inch. Rates vary with size, length of thread, and hardness of material. The machine is also designed to thread double end studs up to 11 inches long. It employs a simple loading and unloading mechanism. Although intended for use with a fully automatic hopper feed, it can be furnished with additional speed changes to reduce the production rates for manual or semi-automatic feeding on short runs.

The two cylindrical die Model B150, Fig. 1, is available as an infeed machine only, but by using the correct dies and feeding mechanism, it can be employed as a high-speed threading machine similar to the Model B910. In addition to the features described for the Model B910, the B150 is equipped with a hydraulic servomechanism which controls die penetration rates. It also has a simplified overload control to protect the dies from damage by oversize blanks. The hydraulic system, which is completely detachable for servicing, is also accessible for standard maintenance when in position. The 12-inch die gap is adjustable to accept various die face combinations for double end studs up to 11 inches in length. A Model B150T, also to be introduced, has the features of the Model B150 plus the capacity for through-feed thread rolling of work up to 2 1/2 inches in diameter and 20 feet long.

Designed for through-feed involute-form rolling, the three cylindrical die Model A425 can be used for rolling involute splines and serrations as well as for burnishing involute gears. A stress ring which holds the three die spindles minimizes spring during heavy rolling operation. The machine is designed for easy matching of the dies and uses the skewed axis type of through-feed for rolling. It employs a hydraulic system for opening and closing the dies, and for overload protection. Independent adjustments make possible precise control of involute-form tooth spacing and lead. The skew system in the Model A425 is accurate to 20 seconds of arc and is simple to adjust. Since the system is entirely independent of the size control, setup is simplified.

The fifth machine to be introduced is a Model A25, Fig. 2, which has a simplified through-feed design. This three-cylindrical-die machine can handle bar lengths up to 20 feet and diameters up to 2 1/2 inches. The stress ring is of a new rigid design that minimizes spring during heavy rolling loads. Skew adjustment is accurate to 20 seconds of arc, simple to use, and not influenced by other adjustments. The sizing adjustment is read directly in 0.001-inch increments from the large size adjusting ring, and die matching is accomplished by the match cup system. A hydraulic system for opening and closing of dies is available when necessary for threading close to shoulders.

Circle 593 on Readers' Service Card

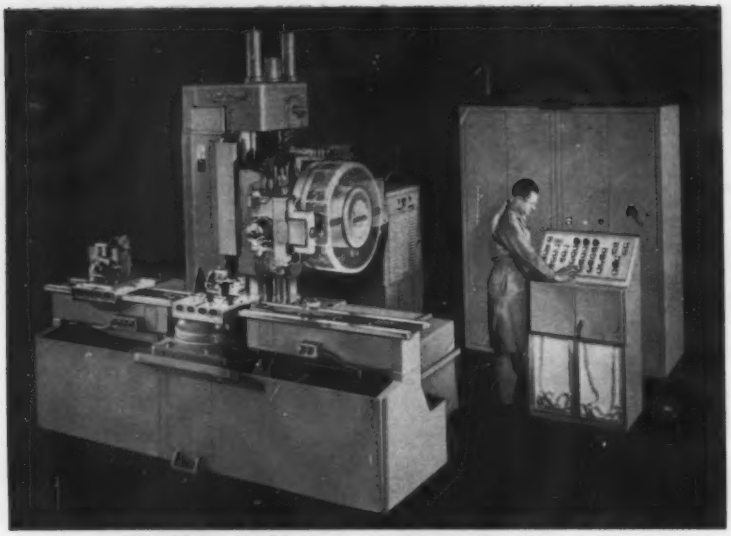


Fig. 1. Rotary table version of the Milwaukee-Matic Model II, called the self-contained "machine shop," has automatic selection of tools from a turret magazine, and all motions programmed by tape

Trend to Numerical Positioning Control Strong in Kearney & Trecker Exhibit

Booth 1008

Three different numerically controlled machine tools will be working in the Kearney & Trecker Corporation (Milwaukee, Wis.) booth. There will be two Milwaukee-Matic Model II machines, one with a rotary table, and one with an eight-position index-table. The third tape-controlled unit will be Model 205-CH vertical style. These machines reflect widely different versions of digital control.

Milwaukee-Matic Model II with rotary table, Fig. 1, is completely numerically controlled, employing a standard 1-inch wide, eight-channel punched tape. This equipment will mill, drill, bore, ream, tap, select, and change its own tools; change feeds and speeds; and transfer the work-piece, all by tape command. The Milwaukee-Matic concept provides for a wide variety of simple or complex machining operations on a given work-piece with a single set-up in most instances. All machine motions are powered by a 30-hp hydraulic unit. Accurate positioning for the most demanding tolerances is accomplished through an electro-hydraulic system controlled by electrical feedback. Spindle speed ranges are from 0 to 4000 rpm in increments of 10 rpm. The feed range is from 2 to 99 ipm, in increments of 2 ipm, with a rapid-traverse rate of 200 ipm. The three axes of motion, X-longitudinal, Y-vertical, and Z-depth, respectively, have ranges to 24, 20, and 16 ipm, top speed.

The 307-S12 plain style knee type milling machine with automatic cycle, Fig. 2, is engineered for high productivity. This versatile machine tool has been re-engineered for maximum strength, rigidity, and accuracy. Minimum down time and lowest maintenance costs are achieved through unit construction. The spindle has a separate 7 1/2-hp motor that provides twenty-four speed changes ranging from 30 to 2400 rpm. Speed changes are hydraulically effected through a single convenient dial. Knee, saddle, and table movements are powered by a separate high torque motor.

All power motions and handwheels are safety interlocked to protect the operator. A simplified automatic cycle system is incorporated in this machine for table control. With this system many table cycles are quickly and easily set to attain the highest productive rate.

Shown in Fig. 3, is Model 307-S12 vertical style knee type milling machine with standard table cycle

Fig. 2. Unit construction and clean lines of Model 307-S12 plain style, knee type miller give high productivity

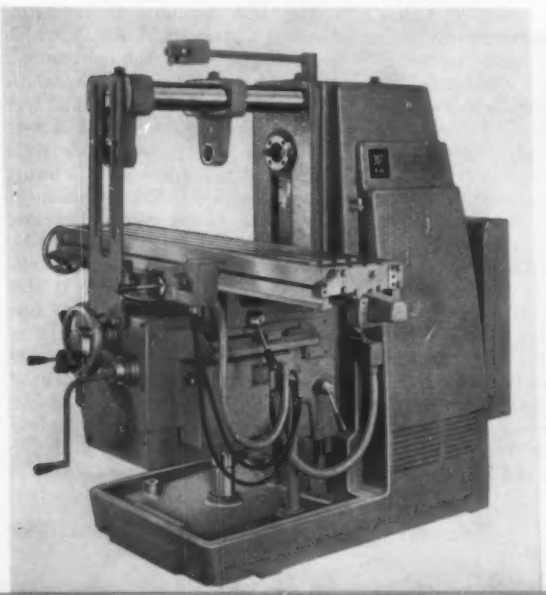
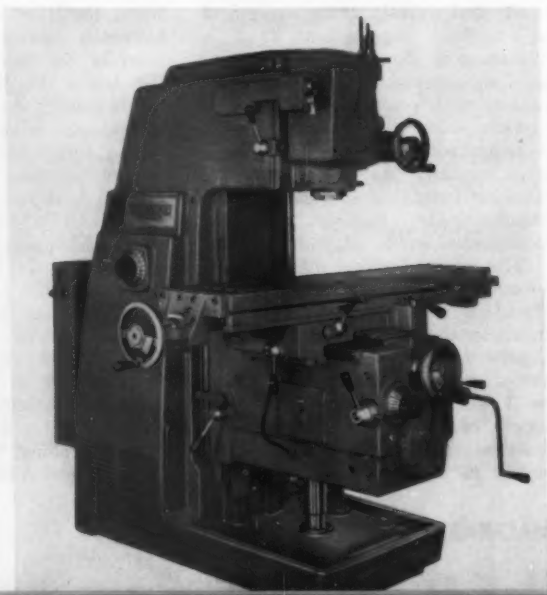


Fig. 3. Teammate to the plain style, knee type miller (left), is the 307-S12 vertical knee type miller



control, a complement to the 307-S12 plain style machine. The vertical head has sixteen feed rates ranging from 1/8 to 16 ipm, and a rapid traverse of 75 ipm powered through its full range of 5 inches. The head is hydraulically counterbalanced to facilitate movement.

Kearney & Trecker's newest "task force" machine tool, the vertical, bed type Model 3006 Mil-waukee-Mil, Fig. 4, is custom-engineered to meet industry's demand for a milling machine with the capacity of a large-bed type plus the versatility of a knee type. A 50-hp motor powers the spindle through twenty-four speeds ranging from 15 to 1500 rpm. Spindle speeds are selected and changed through an electrohydraulic system directed from the pendant. The full 50 hp is delivered at each spindle speed.

The vertical spindle head has a separate 2-hp feed drive motor giving an infinite number of rate changes ranging from 1/8 to 75 ipm, and a rapid-traverse rate of 100 ipm through its full range of 26 inches. Ram and table motions are powered by a 10-hp motor. All feed rates are conveniently selected through separate dials on the pendant. Feed rates are "locked in" by an electrical feedback system, which holds rates constant and independent of changes in load or line voltage.

Fig. 4. Ram and table cycles for vertical, bed type Model 3006 Mil-waukee-Mil are directed by a simplified automatic system

Circle 594 on Readers' Service Card

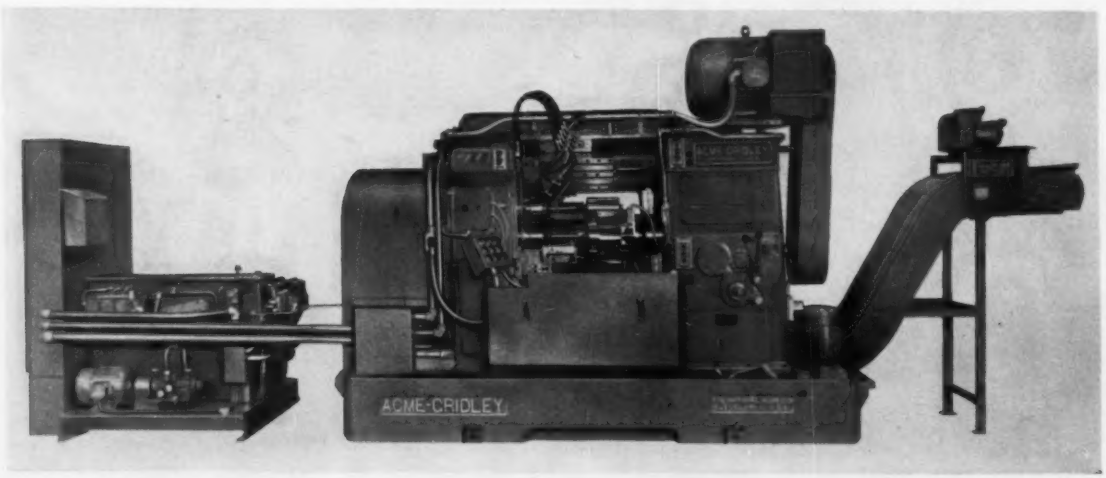
National Acme Exhibit to Feature Automatics, Threading Tools, and Electrical Controls

Booth 781

The National Acme Co., Cleveland, Ohio, will display products of its Machinery, Threading Tools, and Electrical Controls Divisions. The machinery exhibit will feature three new automatics. Among these will be the Acme-Gridley six-spindle universal shaft machine shown in the accompanying illustration. Straight or flanged shafts can be machined between centers on this equipment. Its spindles may be set up with various work-holding and driving devices to suit the work-pieces. Independently cam-operated lower slides are used for turning, hydraulic tracing, or forming. A top slide drive-shaft provides cam drums which allow independent operation of cross-slides, turning slides, or tracing slides in the fifth and sixth positions. An intermediate cross-slide for forming, grooving, and facing is available in the fourth position.

A Chuck-T-Matic single-spindle chucking machine will be displayed at the show. This machine features a variable direct-current motor drive and automatic controls that vary the rotational speed of the spindle so as

Acme-Gridley six-spindle universal shaft machine for relatively long, flanged shafts



to give constant surface cutting speed to the tracer tools. Dual tracer attachments are employed to perform two operations in any selected sequence. Tracer templates position preset tools which automatically actuate controls to obtain proper spindle speeds for any diameter from 7/8 to 9 1/2 inches.

Completing the group of newly developed equipment to be shown by the Machinery Division is an Acme-Gridley 9/16-inch RN-6 six-spindle bar automatic which has over twenty design improvements. Included among its features are disc cams for positive return attachments, a headstock face casting completely machined for accurate placement of attachments, and a fast stock stop for tool clearance in the sixth position. High and low speed cams are located at the gear-box end of the machine. In addition to those mentioned, the following Acme-Gridley machines will be displayed: a 7/16-inch RA-6 six-spindle bar automatic, a 1 1/4-inch RB-8 double-index bar machine, a 1 5/8-inch RB-8 eight-spindle bar automatic, a 5 1/2-inch RB-4 four-spindle bar automatic, and a 6-inch RPA-8 eight-spindle chucking machine.

The exhibit of the Threading Tools Division will feature a new five-chaser thread-cutting tool that cuts threads in a wide range of materials and sizes. It consistently provides threads that meet the specifications of triple-roll gages. Other products including the Acme-Fette thread-rolling head will also be featured. The Electrical Controls Division will exhibit Snap-Lock limit switches, H-type solenoids, and Sealtight control button switches.

Circle 595 on Readers' Service Card

Buffalo Forge Displays New Billet Shear and Drilling Machine

Booth 551

Buffalo Forge Co., Buffalo, N. Y., will demonstrate its new 400 billet shear, left, which is designed to provide continuous service at full capacity in production cutting. Ram capacity is 400 tons, and it operates at speeds up to sixty strokes per minute (free running). The shear will handle square billets up to 4 inches across, rounds up to 4 1/2 inches in diameter, and flat bars up to 12 by 2 inches. Machine stroke is 2 inches.

On an automatic basis, with a specially designed feed table, this machine has a potential of as many as 18,000 cuts per eight-hour shift. Both knives can be removed from the rear of the machine. The number of openings in the knives may vary according to the size of the bars being cut.

The frame is of welded alloy-steel plate and has a guaranteed minimum strength of 65,000 psi. Its mass and weight are approximately double those of previous designs to assure continuous high-speed cutting. A friction type clutch gives protection against overload, while an air-operated automatic oiling system assures minimum maintenance over extended periods of use.

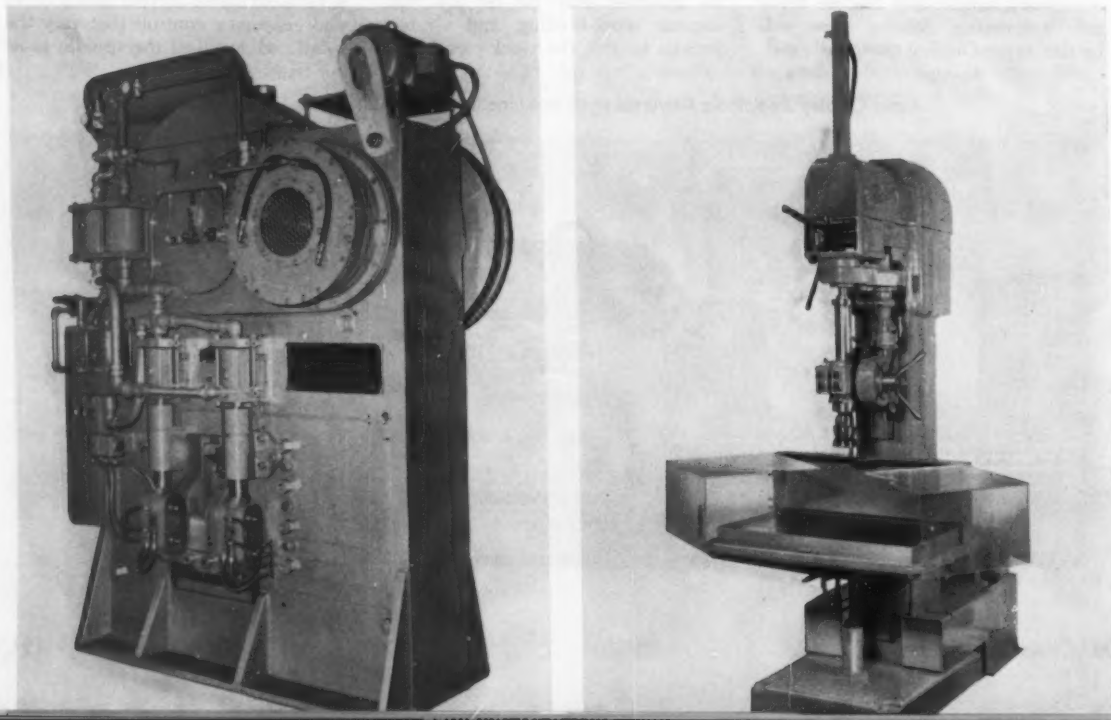
Also to be exhibited and operated is a new "RPMster" hollow-spindle drilling machine, right, featuring a high-pressure coolant system, high spindle speeds, and special feeds. It successfully drills through such metals as titanium, Stellite, and stainless steel, and holes are held close to the drill diameter.

A principal feature is a timing belt that replaces the conventional V-belt drive. Both belt slippage and take-up have been eliminated, and the variable range of speeds is nearly double that of the previous models.

In addition to the billet shear and drilling machine, Buffalo Forge will show an improved model of their bending roll and a No. 1/2 universal iron worker.

Circle 596 on Readers' Service Card

Buffalo Forge 400-ton capacity billet shear (left) operates at speeds up to sixty strokes per minute. "RPMster" hollow-spindle drilling machine (right) will handle such metals as titanium, Stellite, and stainless steel



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C. W. Truxell, General Manager, Detroit Diesel Engine Div., General Motors Corp., Detroit, Mich.

A. P. Fontaine, Executive Vice-Pres., The Bendix Corporation, Detroit, Michigan

Adam J. Quick, Vice-Pres., Production, The Black & Decker Mfg. Co., Towson, Md.

J. W. Guterman, Mgr., Auto. Trans. Engrg. Dept., Trans. & Chassis Div., Ford Motor Co., Livonia, Mich.

M. J. Hoke, Vice-Pres. & Gen. Mgr., The Ohio Crankshaft Co., Cleveland, Ohio.

A. P. Lancaster, Vice-Pres., Mfg. Area "B", Western Electric Co., Hawthorne Works, Chicago, Ill.

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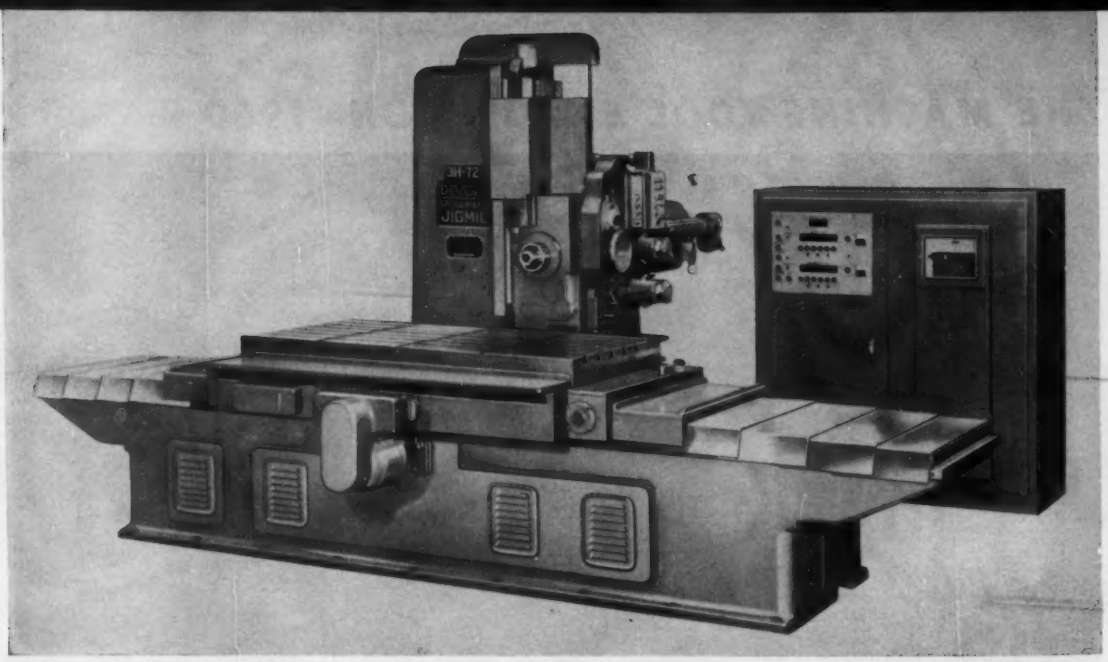


Fig. 1. Wider size ranges are handled by the "H" series DeVlieg Jigmil available with the company's Tapac digital tape control system of programming or Diatrol digital dial positioning

Digital Dial-Tape Controls Share Spotlight with H Series DeVlieg Jigmils

Booth 431

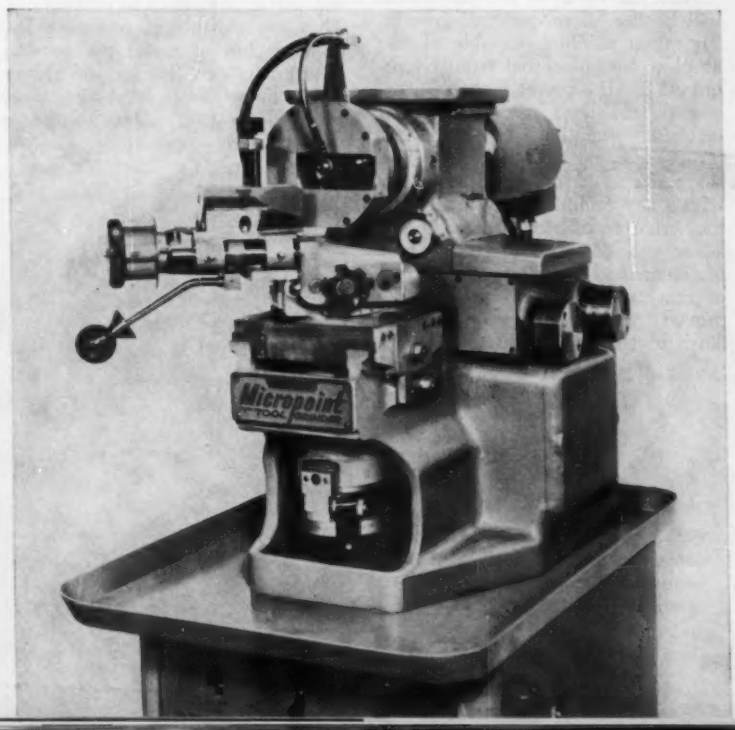
Machine tools to be introduced by the DeVlieg Machine Co., Royal Oak, Mich., are the "H" series Jigmils with Diatrol direct dial dimensioning system and Tapac, the company's self-developed system of numerical tape control. The new series greatly inereases Jigmil range for precision boring, milling, drilling, and other operations. In addition to greater range these machines are more rugged, easier to operate, and more accurate. Spindle sizes range from 3 to 5 inches. Innovations include simplified motion controls and thermal control of main spindle bearings for increased accuracy. Both bed and table have been widened for added stability and working range. Stainless-steel bed way covers provide positive protection from chips and dirt.

Diatrol, to be demonstrated on a Model 3H-48 Jigmil, is the DeVlieg system of direct dial dimensioning. This system of automatic point-to-point positioning lets the operator control locations of the machine spindle and work-table by simply dialing the dimensions.

Tapac, to be shown programming a Model 3H-72 Jigmil, Fig. 1, is the company's new system of automatic tape control. Designed to make full use of the Jigmil's inherent accuracy and precision, Tapac is a point-to-point system for automatically measuring, positioning, and cycling complete parts machining programs using input in the form of standard 1-inch, eight-channel punched paper tape. Machine functions such as selection of spindle speeds and spindle feeds, control of spindle depth, and automatic spindle rapid traverse, feed, and retraction, as well as automatic advance to new hole locations, can be programmed into the tape for the control. In addition to this, the Tapac system provides automatic locking of the slides, tool change warning signal, and operation number designation.

The machine offers an important advantage in the Tapac system because it simplifies the programming procedure when making a tape. Many of the automatic machine movements are functions of the electrical sequences of the Jigmil itself and thus do not have to be

Fig. 2. Preset tool sharpening systems give highly efficient operation when single-point tools are kept in top condition using the Micropoint tool grinder



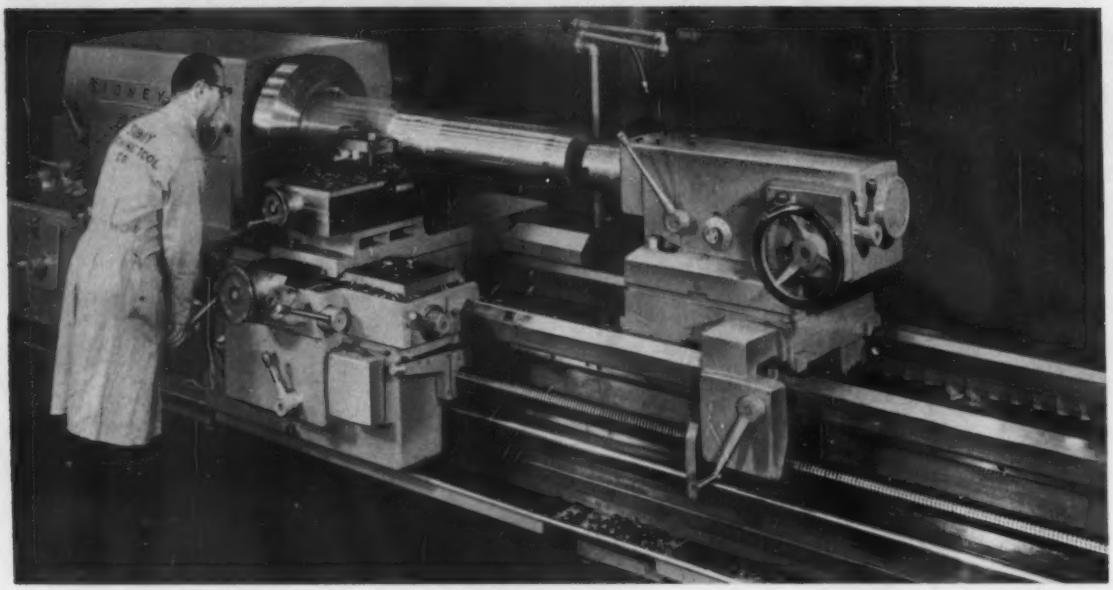


Fig. 1. The Sidney 4025 lathe is offered in bed lengths ranging from 13 to 49 feet in 2-foot increments

programmed into the tape. Locking and unlocking of the slides, automatic table retraction, spindle rapid traverse, feed, and return, automatic tape advance and similar functions are sequenced electrically with full safety interlocks, thus greatly minimizing the programming effort and largely eliminating errors. Only the basic information need be programmed into the tape: horizontal and vertical dimensional settings, spindle speeds and feeds, depth control settings, and tool changes.

Also on view at the Exposition will be the Micropoint tool grinder, Fig. 2, a machine capable of the absolute control of tool geometry required for the preset tooling so essential to the economical and efficient operation of numerical positioning control systems. The sharpener is used in conjunction with a new technique of single-point tool grinding offering the combined advantages of extended cutting tool life, increased accuracy and output of machine tools, and greatly improved uniformity and surface finish of the end product.

Circle 597 on Readers' Service Card

New Heavy-Duty Sidney Lathes Remove 180 Cubic Inches of Steel a Minute

Booth 1440

The Sidney Machine Tool Co., Sidney, Ohio, will exhibit three lathes, available in eight models. Leading the new series is the Sidney 4025 (Fig. 1), a 75-hp extraheavy-duty lathe, in three models, with swings over the bed of 40 1/2, 45 1/2, and 49 inches, respectively. The machines are equipped throughout with antifriction bearings and automatic lubrication to all bearings. They are capable of removing 180 cubic inches of metal per minute. Also in the new line are the Sidney 3220 heavy-duty lathe in three models; the 1307, 10-inch lathe in one model; and the Spacemaster 7250 for missile and aircraft work.

Among the highlights of the Sidney 4025 is the styling. The designers spent considerable time and thought to have all working levers at a height convenient to the operator and therefore achieve speed, accuracy, and ease of operation. The headstock, Fig. 2, features thirty-six spindle speeds in geometric progression with an over-all speed ratio of 160 to 1, which permits the proper surface speed for the greatest variety of work materials. All final drives to the spindle are through

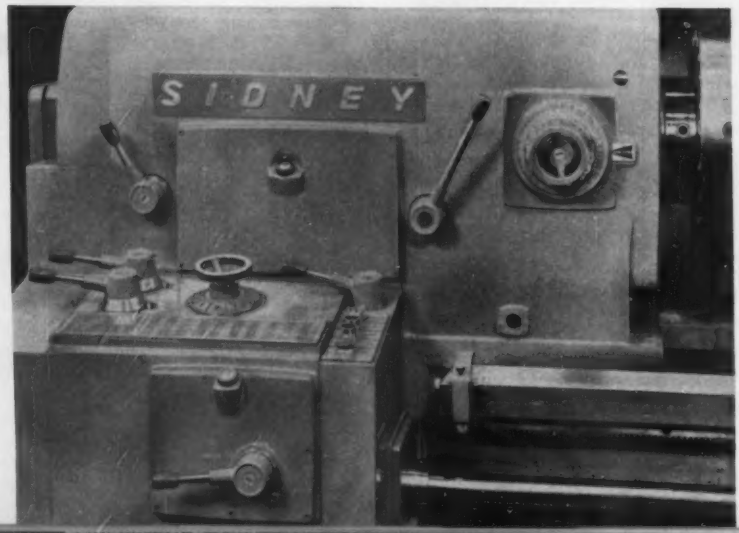


Fig. 2. Simplified controls at a convenient height feature the headstock and gear-box of the new line of Sidney lathes

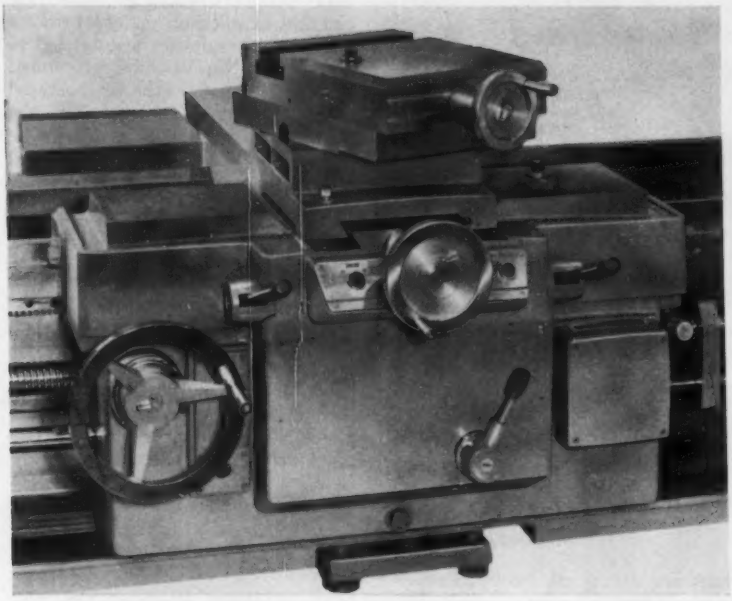


Fig. 3. Carriage and compound of the heavy-duty lathes are rugged, have a full-width, and heat-treated steel top block

opposed helical gears, and all cutting speeds are selected through a single dial control for unusual simplicity of operation in a machine of this horsepower.

The simplified headstock shifting system enables dial setting of either rpm or surface speed. The selection of the latter enables the operator to dial work diameter instead of rpm and assures the proper surface speed. Since there is no speed-up gearing, there is no loss of torque. Constant cutting speed can be maintained by going to a direct-current motor drive. The 4025 is arranged to operate in a range of 5 to 800 rpm, which are unusually low and high for a machine of this size.

With the opposed helix angle, or final herringbone drive gears, the 4025 can achieve a 22- to 26-micro-inch finish. This capability for smoother cutting means that subsequent operations can be eliminated on certain jobs. In addition, smoothness of operation and greatly reduced maintenance are assured because the lathes have hardened and ground or shaved gears in the headstock, which also features SAE involute splines throughout and automatically metered spray lubrication.

The machine's end gearing is totally enclosed in a cast housing and automatically lubricated. Shafting has antifriction bearings throughout, and all gears are hardened and shaved. A notable advantage in the end gearing is the provision for converting from conventional to metric thread leads. Here, the much simplified 1-to-1 end-gear ratio gives quick and accurate conversion for greater flexibility in production. Gears for both metric and special leads are available.

The new gear-box introduces a dual-cam tumbler lock that was specially designed to overcome gear and cone gear unlocking during exceptionally heavy feeds. The gear-box has antifriction bearings throughout and has automatic filtered lubrication. Further, as standard equipment, it provides sixty threads and feeds which give more versatility. The gear-box direct-reading feed and thread reference plate provides ready visual access to setting data, together with dial and lever controls. The carriage, Fig. 3, features variable rate, four-way power rapid traverse, to combine maximum control with simplicity of operation. At the same time, when the feed is engaged the carriage is fully protected against jamming through such safety devices as the electric clutch and pressure-release mechanisms, which prevent apron damage should the operator accidently run the carriage into an obstruction.

The apron's worm-gear drive for feeds gives smooth, easily handled power plus precision to the lathe's heavy cutting capability. In addition, feeds may be separate or synchronized, giving full versatility to this operation. Optional equipment includes complete tracer controls, numerical positioning controls (with simple retrofit), European style toolrest, electrical apron controls, steady and follow rests, a taper attachment, a length-measuring device, dual cross-feed dials, dual compound dials, and automatic length feed-stops.

Circle 598 on Readers' Service Card

Hannifin Assembly and Trimming Presses

Booth 652

High-speed hydraulic assembly and trimming presses will be displayed by the Hannifin Co., Des Plaines, Ill., a division of Parker-Hannifin Corporation. Two of the nine presses in the booth will be in actual operation. In addition, several air presses and Hy-Power hydraulic punching and riveting machines will be shown.

One of the production presses will be used in the press-fit assembly of backup washers on leakproof straight thread fittings. The other will demonstrate a trimming operation on die-cast parts at unusually high speeds. As evidence of its versatility, this unit will be using tooling that has been "lifted" directly from an open-back inclinable press, and will be mounted on wheels to show its mobility.

Circle 599 on Readers' Service Card

Hannifin 4-ton hydraulic press with 20-inch indexing table

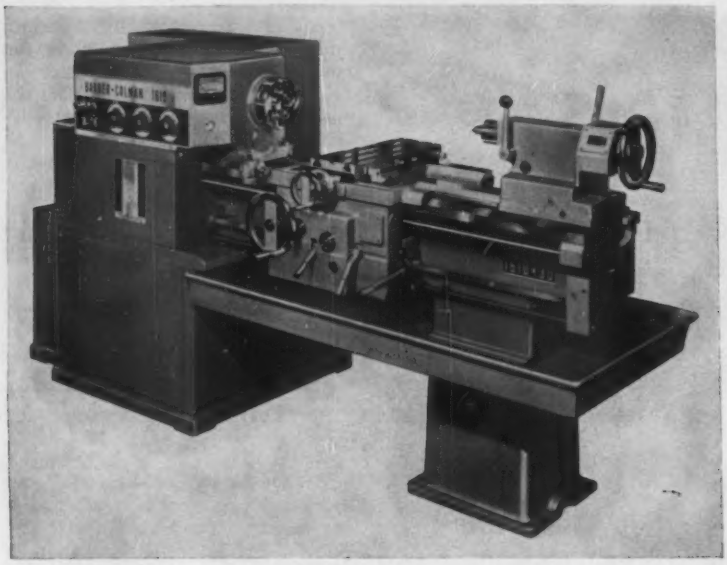


Fig. 1. Feed and spindle-speed changes are dialed into the headstock of the Specialist lathe without stopping work

Increased Productivity and Versatility Shown in Barber-Colman Lathe and Hobbers

Booth 923

The "Specialist," a 16-inch production lathe being introduced at the exposition by Barber-Colman Co., Rockford, Ill., is designed specifically for high-speed turning, facing, and boring operations. Controls, feeds and speeds, and principles of design have turning operations as their special target. The Model 1610 machine, Fig. 1, has no gear-box or threading equipment, as does an engine lathe. Operators require less skill and can turn out more and better work because a minimum of technique is required. Speeds and feeds can be changed at any time simply by turning dials on the headstock. No time is lost shifting gears or stopping the machine in order to make these adjustments.

Spindle speed of the 1610 is instantly, independently, and infinitely variable without stopping the cut. This makes it easy for the operator to regulate surface speed for a finer, more uniform finish. Maximum, belt-driven speeds are available to 2500 rpm. For heavier cuts at low speeds, an optional back-gear drive with a 4-to-1 reduction is available. Power feed to both carriage and cross-slide is infinitely variable from 0.079 to 24 ipm. Feed per revolution can be varied from 0.0001 to 0.488 inch, depending upon spindle speeds. This makes it easy to produce fine finishes, and often saves the cost of an additional machining operation.

When equipped with a hydraulic tracer, as illustrated in Fig. 2, available as an accessory, maximum economy can be achieved on short- or long-run turning jobs, with slow-speed threading operations are reserved for older and slower machines. The net result is greater total machine utilization with production doubled on many jobs. Less than twenty minutes are needed to set up the No. 1610 front-mounted tracer. The lathe can be operated manually without removing the tracer, or the attachment can be replaced by the regular compound in less than ten minutes. The tracer operates at angles from zero to 90 degrees with the work axis, and controls the machine consistently within 0.001 inch on diameter or length.

A compact, vertical hobbing machine in the exhibit (see Fig. 3) will demonstrate a combination of speed and versatility that cuts costs in both short and long runs of gears. Cycle times are now shorter. The machine is more rigid and there are new automatic features that add up to increased machine utilization and versatility.

Automatic cycling of the Barber-Colman No. 4-6 includes carriage feed, retraction after the cut, and rapid carriage traverse to starting position. The machine is designed specifically to be tooled for automatic loading. Its ease of setup and operation, however, adapt the hobber to manual loading of relatively small lots. Combined high speeds and minimum nonproductive time between cuts makes this machine equally efficient whether used in a general-purpose gear shop or in an automotive plant requiring high-volume production. An example of the latter is thirty-second total cycle time for each load of two 12-14 pitch, nine-tooth AISI 1024 steel automotive spur pinions, Fig. 5. On

Fig. 2. The front-mounted tracer for the No. 1610 lathe often doubles the production of turning jobs not requiring threading

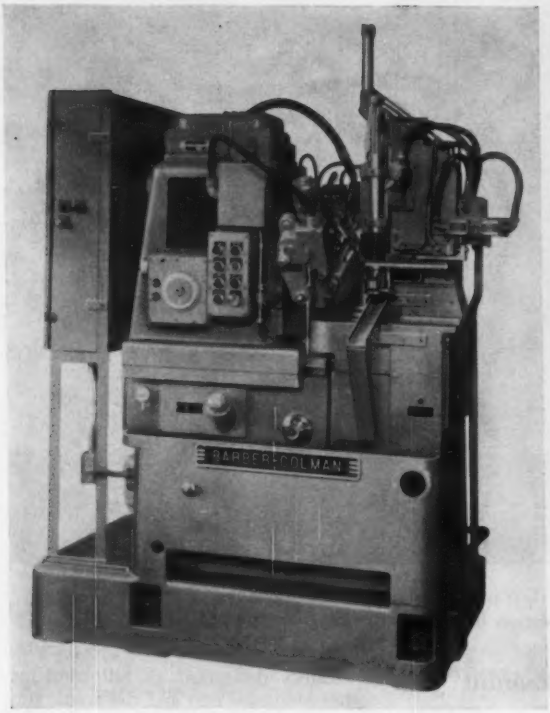


Fig. 3. The integral bed, spindle housing, and upright design of Barber-Colman's new Model 4-6 hobber give extra rigidity and facilitate mechanization

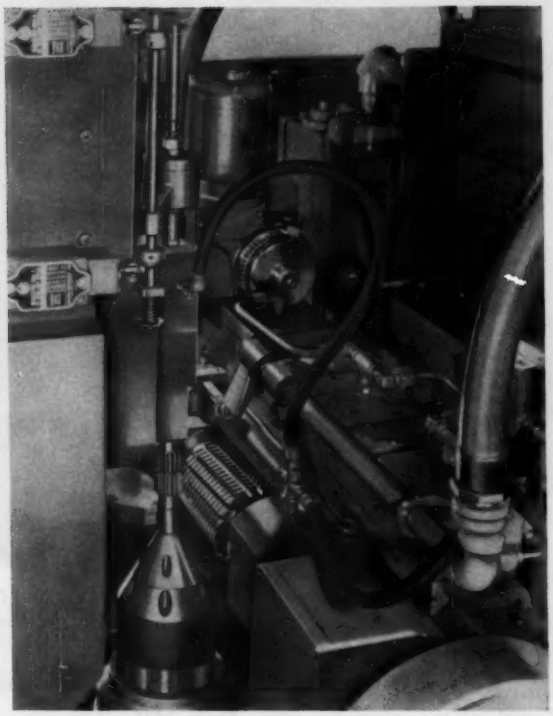


Fig. 4. Automatic cycling of Model 4-6 covers carriage feed, retraction after cutting, and rapid traverse of the carriage to start

Fig. 5. A pair of 12-14 pitch, nine-tooth automotive spur pinions is cut in thirty seconds on the new hobber

this setup, a 3 1/4-inch diameter by 4-inch long triple-thread hob operates at 362 rpm (308 sfm), and the feed is 0.045 ipr. Hourly production is 240 at 100 per cent efficiency.

The machine is automatically loaded when a shuttle places a pair of blanks under the hydraulically actuated tailstock, locking them in position against the serrated driver. After the cut, the shuttle unloads the finished work and picks up the next two blanks. Automatic hob-shifting is an integral part of the automatic cycle. The device can be set to operate after each cycle, or after a certain number of gears has been cut. This feature assures even hob wear and high production at low tool cost. Hobs longer than standard size can be used to reduce the number of hob changes, Fig. 4.

The vertical design—with the bed, spindle housing, and upright integral—provides extra rigidity and simplifies application of automatic tooling. The vertical column rigidly supports all motions of the machine. Movements of the columns in both directions are controlled by positive stops. Hydraulic pressure holds the column firmly against a depth stop during the cut. Close-coupled design, with short shafts having high diameter-to-length ratios, minimizes vibration and deflection. Antifriction bearings are used throughout the hobber. Both hob and work-spindles are mounted in precision tapered roller bearings. Maximum hob speed is 614 rpm, and maximum feed is 0.150 ipr.

Model No. 2 1/2-4 hobbing machine (not shown) offers a potential cost advantage to producers of AGMA Precision Class 3 gears. The hobber generates fine-pitch spur gears with heretofore unattained accuracies for a relatively low-cost machine. It meets requirements for making the highly accurate gear trains in instruments for guidance and control systems of missiles, high-speed aircraft, radar, and other navigation and sensing equipment. Selection matching is no longer necessary to insure Class 3 spur-gear sets.

Key to the accuracy of the new machine is its fixed-position work-spindle. So rigid and precise are the matched index worm and mating worm-gear, the antifriction spindle bearings, and the ground tapered fit between the worm-gear and spindle, that the company is guaranteeing machine indexing accuracy to 20 seconds of arc. This means that at a 2-inch diameter, nonadjacent tooth-spacing error, traceable to machine performance, will be within 0.0001 inch. Finish grinding or shaving and hand selection are obviated.

Contrary to conventional design, the work-piece on the No. 2 1/2-4 does not swivel, shift, raise, or lower. All adjustments, including depth setting, are made right on the hob carriage. Direct power take-off for the feed screw eliminates feed-torque error in hob-to-work timing.

Circle 600 on Readers' Service Card

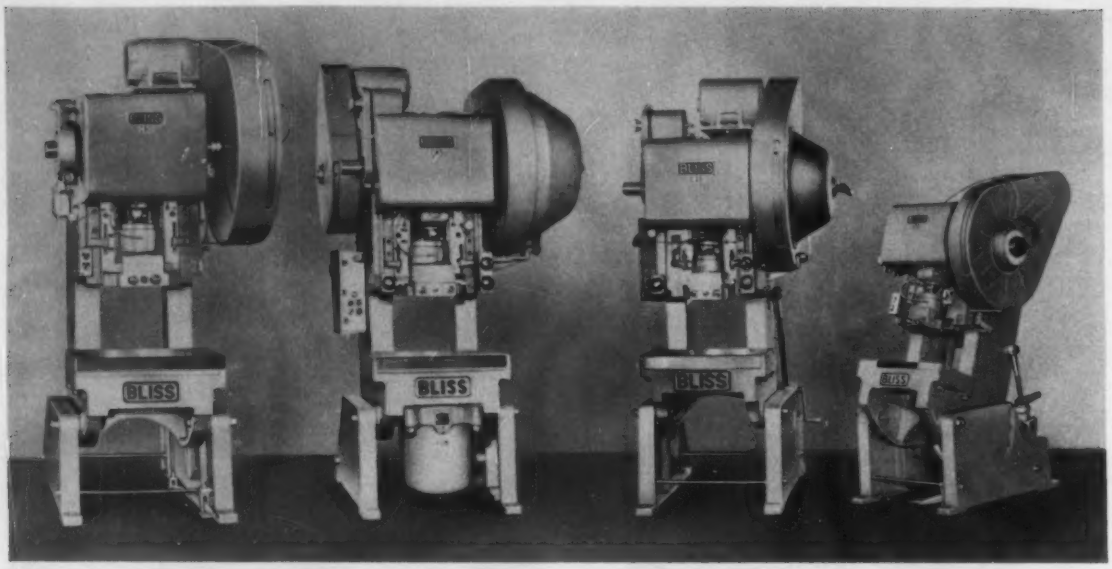


Fig. 1. Completely redesigned, the Bliss "Big C" OBI press line offers a cast Meehanite frame that reduces deflection, plus many de luxe design features borrowed from big presses

New OBI Presses Demonstrated in Bliss Exhibit

Booth 1325

"New Ideas in Pressed Metal Production" is the exhibit theme of the E. W. Bliss Co., Canton, Ohio. Focal point of the exhibit will be four different models of the company's new "Big C" series presses, Fig. 1, representing the latest concepts in the design and construction of inclinable presses. Also on display will be a variety of other equipment, representing not only advances in the field of pressed metal, but also Bliss' growing diversification in the area of automatic production.

The "Big C" series inclinable presses have enlarged dimensions and specifications that give them measurable advantages over previous models. Models in four tonnages—22, 35, 45, and 60—will be displayed, including both geared and non-geared types. Most important among the new features are the modern, cast Meehanite frame which reduces deflection at full tonnage, the increased bed and die areas, and the heavier design of all load-bearing working parts. Other new design features include extra-long slide adjustment (Fig. 2), laminated bronze gibs, "CK" clutch on all tonnages, combination controls, and air torque limiter. An unusual accessory is a portable inclining jack, Fig. 3, that can serve a whole battery of presses, eliminating the cost of a separate inclining unit for each press.

The high-production press is provided with an "S" clutch, which is

Fig. 2. Unusually long slide adjustment, ease of locking, and a stronger connection enhance new OBI presses

Fig. 3. Press-to-press interchangeability of a press-inclining jack permits one device to serve a whole battery

basically a combination of the new "CK" clutch built into a standard Bliss high-production punch press brake. A special feature of this press is the "unsticking" device. If the press sticks at bottom during die tryout, a bumper pin is inserted in the flywheel. After backing up the flywheel until the bumper pin contacts a mating lug on the clutch, the press is started. The flywheel makes one complete revolution before striking the clutch lug again. Momentum bumps the slide free.

Another feature of the exhibit will be an inclinable press (not shown) which has a rated top speed of 1200 strokes per minute—far faster than any previous Bliss inclinable press. It is a 35-ton model, designated CH-35, and represents a completely new high-speed, gap-frame press line, equipped with crankshaft-mounted, electric friction clutches.

The 400-ton impact extrusion press in the exhibit will produce a variety of hollow aluminum shapes, such as containers, flashlight battery cases, collapsible tubes, and similar products. Its top speed of 120 strokes per minute is twice that of previously available equipment of this type—a long step forward.

A precision positioning and piercing machine, (not shown), locates holes accurately within 0.001-inch, and can be set up by an operator in less than one minute. Basically, the machine consists of a two-axis positioning table and a bench press. It is ideally suited for piercing accurately positioned holes in sheet metal or in fiber parts, such as printed circuits.

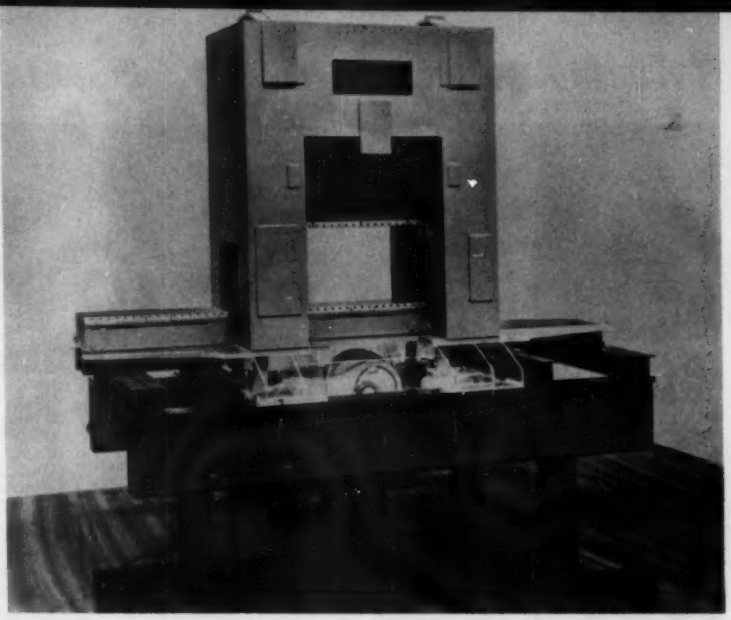
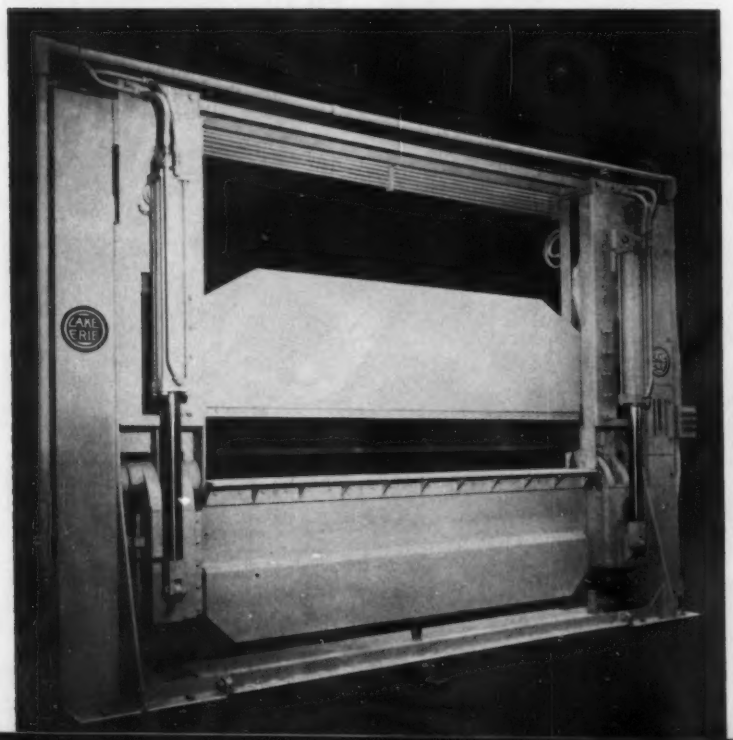


Fig. 4. Working model of a huge rolling bolster press will demonstrate impressive efficiency

A rolling bolster press will be displayed as a model, Fig. 4. This new type of press is equipped with a double bolster that moves on a track, back and forth through openings in the press frame. Dies are changed on one bolster while the press is producing stampings from the dies mounted in the other. Thus, the press operates 90 per cent of the time, instead of the approximate 40 per cent availability of conventional straight side presses equipped with a single bolster. Actual changing of dies takes only a few minutes.

Circle 601 on Readers' Service Card

Units in the line of Form-All brakes have a working range for bending sheets 16 gage by 24 inches long, up to 3/4 inch plates 16 feet long



Press Brake Plate Bending Without Dies

Booth 542

Two versions of a double-apron bending brake, recently announced, will be demonstrated bending intricate shapes in the exhibit of the Lake Erie Machinery Corporation, Buffalo, N. Y. Air and hydraulically powered Form-All machines will demonstrate the production of one-piece sheet and plate sections, impossible by any other means. The front and rear aprons are independently operable so that choice in the resulting variations in form can be infinite. Examples of the machine's versatility: sharp angular bends on or at the end of a radius, and full 360-degree radius bends. Consequently, deep channels, box forms, and cones can be easily made and accurately reproduced.

The large hydraulic unit has all motions and settings operated by push-buttons, including the individually calibrated controls for setting the precise angle of bend by each apron, and the control for setting the upper clamping blade to accommodate differences in plate thickness.

Circle 602 on Readers' Service Card

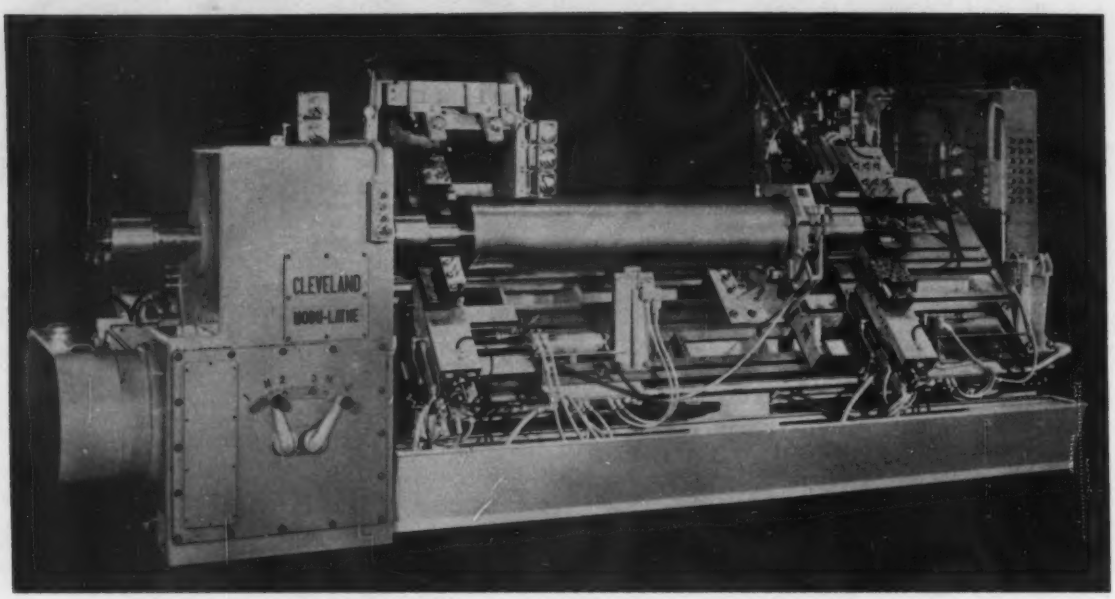


Fig. 1. Cleveland Modu-Lathe offers flexibility of modular construction

Modular Lathes, Chipbreaker, and "Data Transcutter"

Booth 642

Equipment shown by the Cleveland Hobbing & Machine Co., division of Textron, Inc., Cleveland, Ohio, will include a line of Modu-Lathes (machine tools of modular construction) Fig. 1. Each tool is a combination of one of four available headstocks, and one of six available beds. Each can be built up, using standard components, into an engine lathe, turret lathe, profiling lathe, automatic bar, chucking machine, and others. These machines are "obsolescent-proof" because they can readily be reconstructed to meet changing requirements of the user.

Two new devices being introduced are a chipbreaker, Fig. 2, and a "data transcutter," Fig. 3. The chipbreaker fragmentizes chips to a desired size, helping to lengthen cutting-tool life. Mounted on lathes, automatics, planers, and shapers, the device is particularly effective for grooving and parting operations. The data transcutter cuts axial grooves, raised beads or keys, various art designs, and oil-retaining recesses from photographs, drawings, templates, or tape while the work is undergoing normal machining. Like the chipbreaker, it can be used on different types of machine tools. A model mounted on a Modu-Lathe will be in operation at the booth

A machine for finishing hardened gear teeth will also be on display. It employs high-frequency oscillations to produce a reciprocating motion in combination with a slow rotating motion. In addition to removing nicks and burrs, this machine corrects lead, involute, and other geometry of the gear tooth. Single and multiple-spindle models are available for spur and helical gears to provide either straight or crown finishing.

The company's line of Rigidhobbers will be represented by a Model 188 single-spindle machine equipped with a continuous automatic shifting hob head, sine bar, "O" cycle, and automatic loading mechanism.

Circle 603 on Readers' Service Card

Fig. 2. Chipbreaker fragmentizes chips to desired size

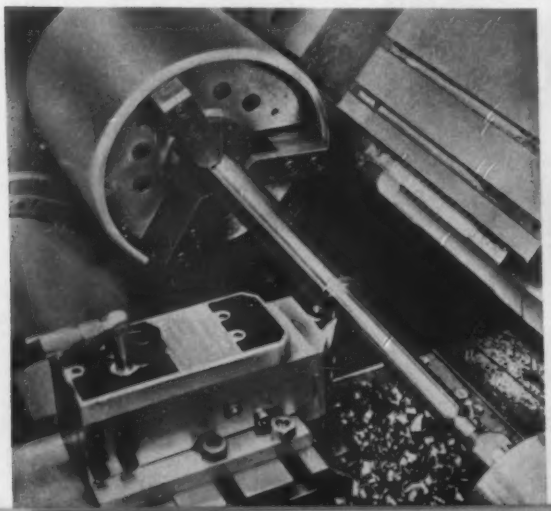
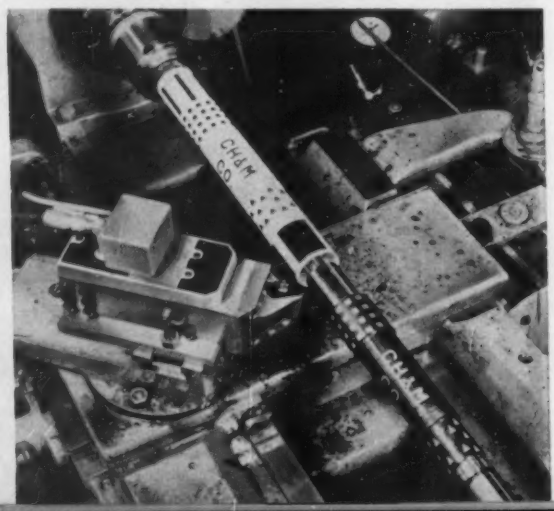


Fig. 3. Data transcutter imparts design along work axis



Motch & Merryweather Assembles Vertical Turner from Building Blocks

Booth 822

The Model 1-V vertical turner, Fig. 1, has been assembled for the Exposition from components produced in low-cost lots to hold down expense. This Motch & Merryweather Machinery Co. (Cleveland, Ohio) machine tool is unique in its ability to make a mass forty-six-second, chip-removal attack on the work-piece being turned. On the motor end-bell blank, Fig. 2, a greater than usual number of machining operations occurs simultaneously. Several different diameters are rough-bored and turned and then finish-bored and turned, Fig. 3. The old method required two separate chuckings on conventional equipment and consumed a total of 11.6 minutes.

To start the operation, the operator simply places the end bell on the chuck and presses a button, activating the chuck jaws which grip the piece firmly. When he touches another button, the vertical turner goes through a complete machining cycle without further manual control. Rough and finish boring and turning are accomplished in one smooth, hydraulically controlled movement. This is sequenced by a greatly simplified programming system, which a production man of average training and intelligence can change to suit altered production requirements. When product models are changed and major modifications in the role of the machine are required, it is a simple matter to remount slides on the columns, to reset cutting tools, and to alter the program sequence.

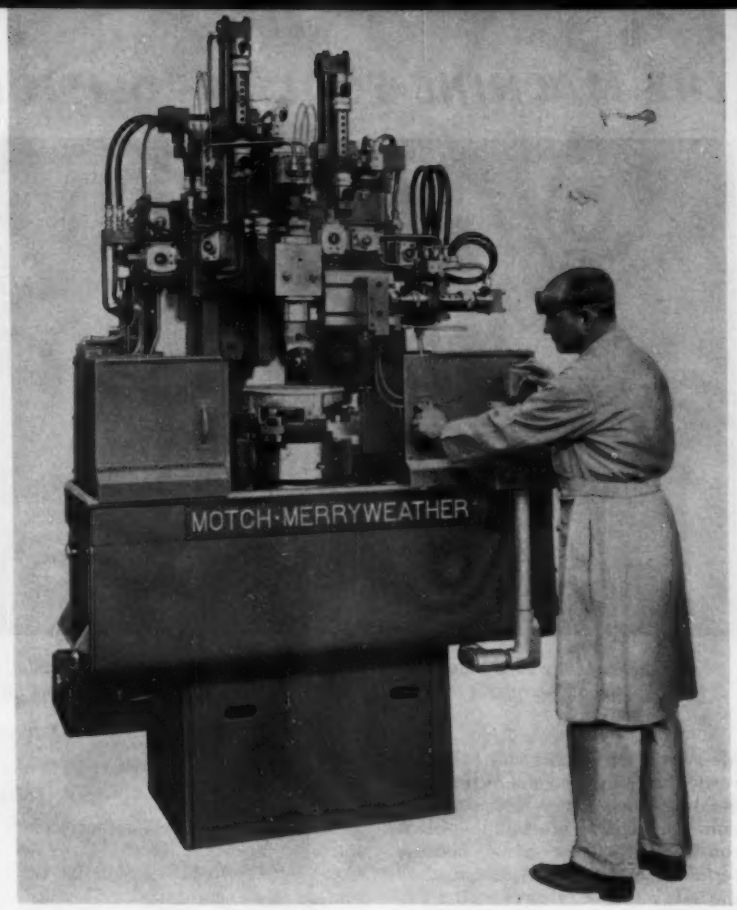


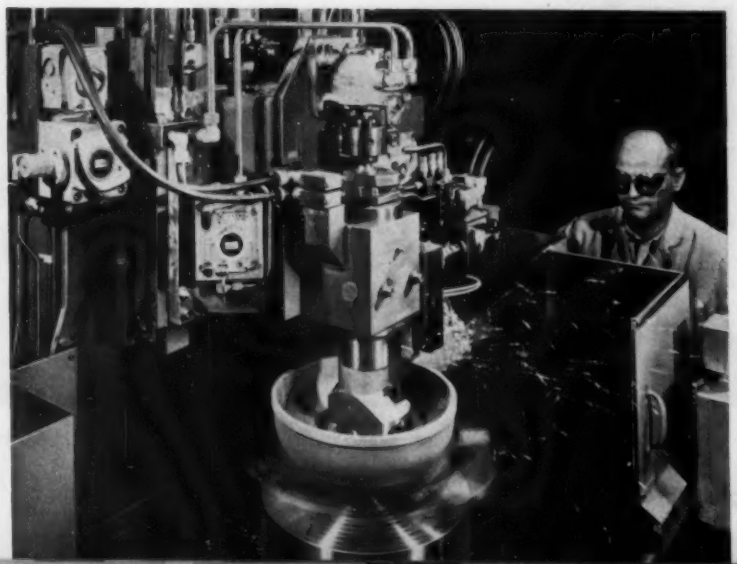
Fig. 1. One vertical slide feeds the boring tools to the work; the other slide acts as a saddle, giving vertical movement to a cross-slide component

Each vertical turner is custom-built to meet the customer's requirements for boring, facing, and turning, either in rough or finished form. Spindles; tool-slides; electric and hydraulic systems; and rigid, internally ribbed cast-iron bases and columns are made and finished in multiple lots. These building blocks are assembled from storage on short lead times as required. From them Motch & Merryweather builds special-purpose machines which have one or more spindles, with many hydraulically controlled tools on slides mounted on one or more columns.

Also operating in the Motch &

Fig. 2. Motor end bell machined by the 1-V machine at the exhibit is for Electra Motors Co.

Fig. 3. A facing and outside diameter cut are turned on the end bell while several boring and facing cuts are made for the bearing recess



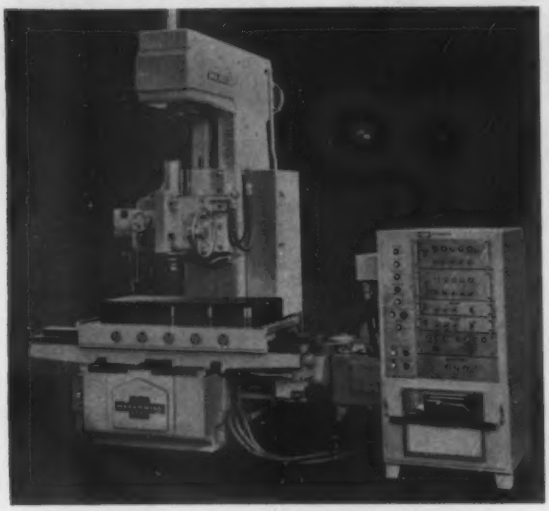


Fig. 1. Numerically controlled Healdrill equipped with Cincinnati Acramatic tape-control system

Fig. 2. Model 090 Centri-Matic miniature internal grinder for bearing races and small parts

Merryweather exhibit will be a 2-V vertical turning machine of the same building-block design and construction. Similarity of building-block construction will be obvious because certain components are identical to the 1-V machine. However, the 2-V will be operating with a tool turret, a hydraulic tracer, and also a necking slide.

Another unit in the display will be a Model O-4 high-speed circular saw cutting off 3-inch solid aluminum round stock in three seconds at 12,000 sfm, and the company's single-end milling and cutting machine.

Sharing this exhibit space will be the company's Avey division which will display six drilling machines of different types, one of which will be the new tape-controlled Model 250, and one automatic index-table.

Circle 604 on Readers' Service Card

Heald Drilling, Boring, and Grinding Machines

Booth 924

Among the six machine tools to be introduced by the Heald Machine Co., Worcester, Mass., will be the numerically controlled Healdrill shown in Fig. 1. Equipped with Cincinnati Acramatic tape control, this machine permits direct programming of all functions: table positioning, speeds, feed rates, and tool changes. It features spindle depth control and an automatic cycle which enables the equipment to operate unattended while drilling hole patterns which conform in diameter. Spindle speed range is 30 to 1800 rpm (in sixteen increments). The Healdrill will be shown drilling a large aluminum gear cover plate.

The company's new miniature internal grinder for bearing races and small cylindrical parts, the Model 090 Centri-Matic, is illustrated in Fig. 2. This equipment permits handling work with an 0.040-inch inside diameter and 0.050-inch minimum outside diameter. Design features include: shoe type centerless workholding, wheel-head speeds to 150,000 rpm, electronically controlled machine functions, and isolation of heat-producing equipment. The grinding of miniature bearing races will be demonstrated on the machine.

The Model 171A internal grinder seen in Fig. 3 can handle work with a swing of 8 inches and a 90-degree included angle. It has a wheel-head that is mounted on a cross-slide and fed into work. This design allows

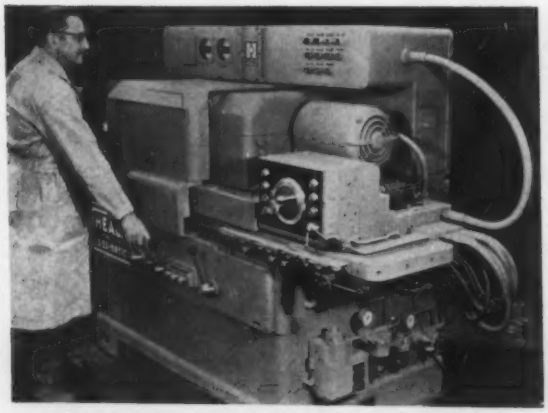


Fig. 3. Model 171A internal grinding machine

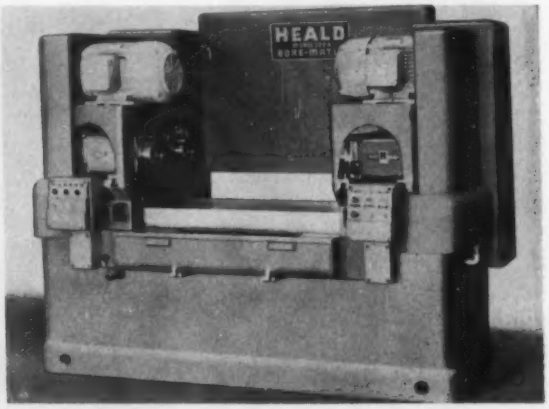


Fig. 4. Heald Model 322A Bore-Matic

heavy roughing cuts and fast feeds. Infinitely variable compensation for wheel wear (0 to 0.004-inch) and fast-acting, miniature direct-current valves are provided. The grinder is available in Size-Matic, Gage-Matic, or plain models. It will be shown grinding stainless-steel sleeves.

Model 322A Bore-Matic (Fig. 4) has only the piston and cylinder located in the machine base; hydraulic units, valves, and piping are positioned externally for tolerance control and servicing. It also has infinitely variable boring head setback. Boring of dummy aluminum discs on this equipment will be done as a demonstration job.

The tape-controlled Model S Bore-Matic (Fig. 5) is one of several types of Model S Bore-Matics now numerically controlled with the Cincinnati Acramatic system to enable

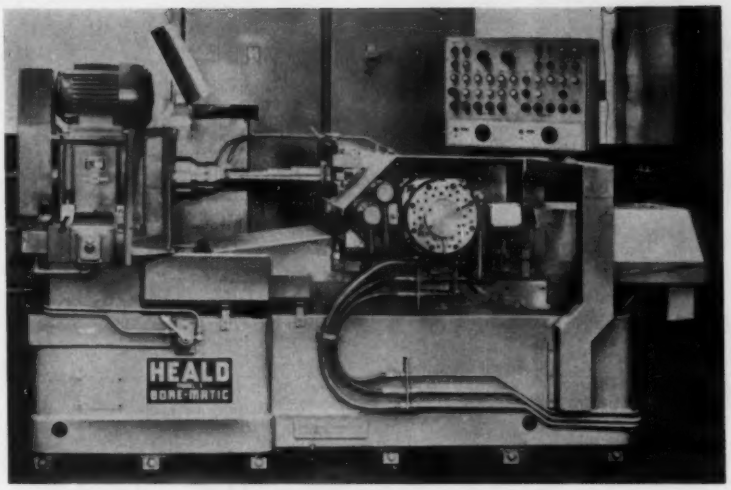


Fig. 5. Bore-Matic Model S equipped with Cincinnati Acramatic tape control

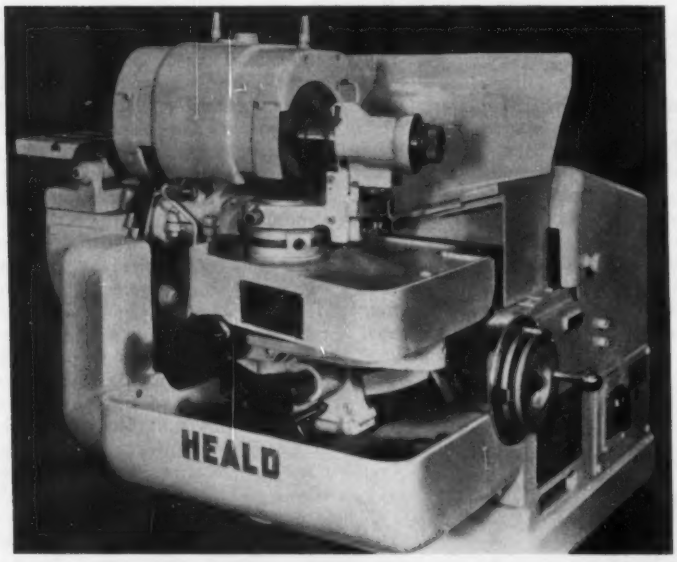


Fig. 6. Heald Model 4 tool sharpener

boring and turning of free-form shapes to within ±0.0001 inch. Its spindle drive, which is specially designed to turn within 0.000030-inch full indicator reading, is cam-controlled. The machine has pressure-lubricated box type ways.

Also to be shown is a Model 4 tool sharpener (Fig. 6). This machine permits either elliptical or true-radius tip grinding of carbide or high-speed steel tools. It features adjustability of the axis of tool-holder oscillation and an additional fine vertical setting to grind a true radius. Tool reciprocation is completely automatic and setup and operation are simple. Many other of the company's grinding and boring machines will also be displayed and demonstrated at the Exposition.

Circle 605 on Readers' Service Card

Hamilton Hobbing, Drilling, and Tapping Equipment

Booth 486

Hobbing, drilling, and tapping equipment for small precision work will be shown by the Hamilton Tool Co., Hamilton, Ohio. A No. 00 hobber will perform gear-generating operations, producing 180-pitch, nine-tooth spur gears having an outside diameter of 0.0611 inch. Small bevel gear teeth will be generated on a No. 1-B hobber.

One of the new machines on display will be a Maximus sensitive drilling machine, equipped with a compound table and a toolroom base. Other sensitive drilling machines on exhibit will be the Varimatic, the Maxi-Jr., and the A-M. A new sensitive tapping machine will also be shown.

Circle 606 on Readers' Service Card

Hamilton Tool Co.'s Maximus sensitive drilling machine

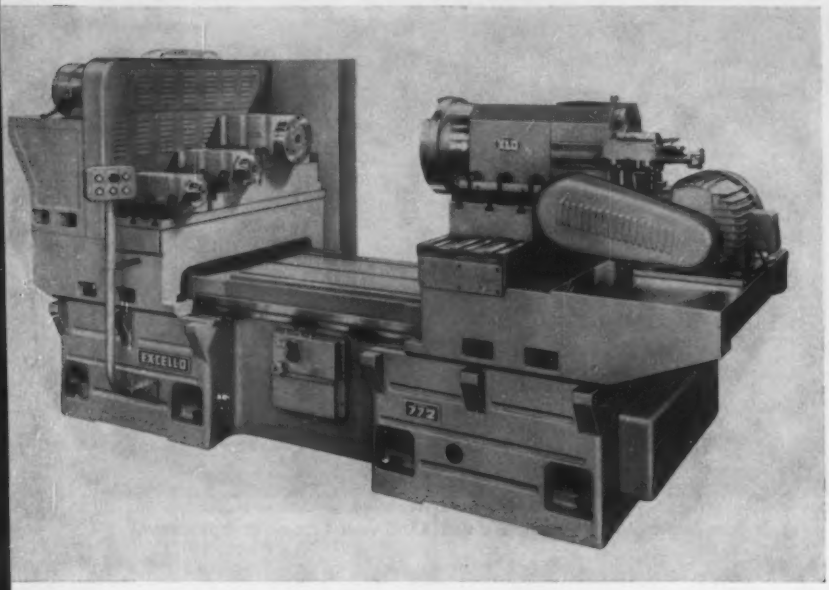


Fig. 1. Largest boring machine in the Ex-Cell-O line

Ex-Cell-O Precision Boring and Grinding Machines

Booth 946

An extensive line of boring, grinding, and electric-discharge machines will be demonstrated by the Ex-Cell-O Corporation, Detroit, Mich. In Fig. 1 is shown the largest standard horizontal precision boring machine in the line, Model 772. This double-end unit features a heavy ribbed base and table, widely spaced ways, hydraulic power, and two infinitely adjustable feeds. Various standard spindle bridges, spindles, facing heads, motor bridges, and drive equipment can be incorporated to suit precision boring, turning, facing, grooving, and chamfering operations on a variety of large work-pieces.

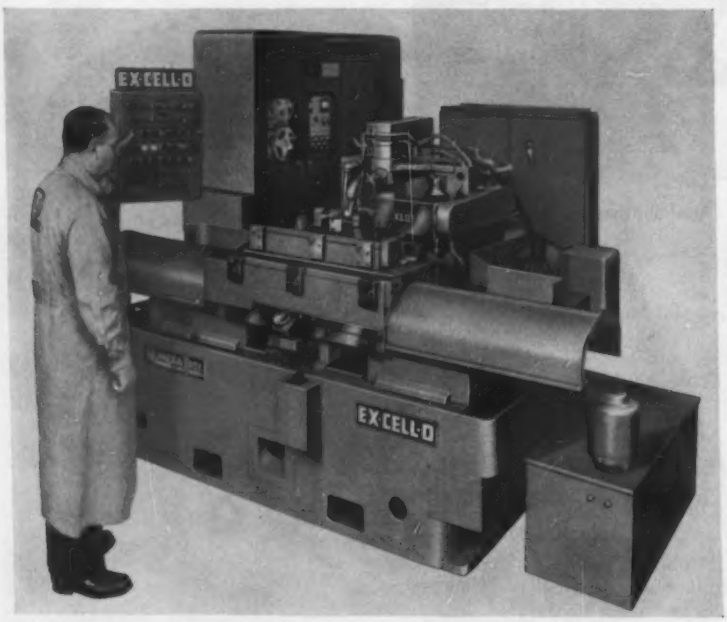


Fig. 2. Numera-Trol setup with template-grinding head

A numerically controlled machine which can be converted from a template grinder to a boring and turning machine through interchangeable heads is shown in Fig. 2. Identified as Model 922 Numera-Trol, this two- or three-dimensional tape-run machine has a rigid bed, hand-scraped ways, recirculating ball lead-screw and nut assemblies, and preloaded thrust bearing supports on each end. Only 5 1/2 pounds direct pressure is required to overcome initial inertia of the cross-slide, despite its weight of nearly 1000 pounds. The machine is designed to operate from any high-performance numerical-control system. Quantizers geared to the servomotors provide closed-loop feedback sensitive to incremental pulse values of 0.000025 inch.

The Model 731 machine, Fig. 3, is a single-end boring machine (one of two new single-end and two new double-end models) featuring temperature-controlled hydraulic panels, redesigned bases and tables, and new and relocated table stops for more accurate repeatability. It can be operated either manually or automatically, and is easily adaptable for point-to-point numerical control or incorporation in an automated production line.

A dual-purpose Model 264 electrolytic tool grinder, Fig. 4, designed especially for carbides, features a diamond wheel and large tool-rest table for face grinding at one end, and a narrow straight wheel at the other end for grinding chipbreaker grooves. A tank within the machine base contains the electrolytic solution, and a motor-driven pump supplies the solution to the grinding wheels. The angular setting of the table is easily adjustable, and is read by a degree-graduated quadrant. The power unit converting alternating to direct current is in a separate console and automatically controls the voltage for optimum cutting.

The latest in multiple-spindle concepts for precision boring a number of small holes simultaneously is embodied in Ex-Cell-O's Model 712 machine, Fig. 5. Interchangeable multiple-spindle plates, quickly and easily detachable, permit full utilization of the machine for job-lot production. Plates containing from one to ten individual spindles can be used. Of double-end construction with spindle plates on both ends, the equipment has a fully automatic cycle, and close tolerances on hole diameters and center distances are easily obtained.

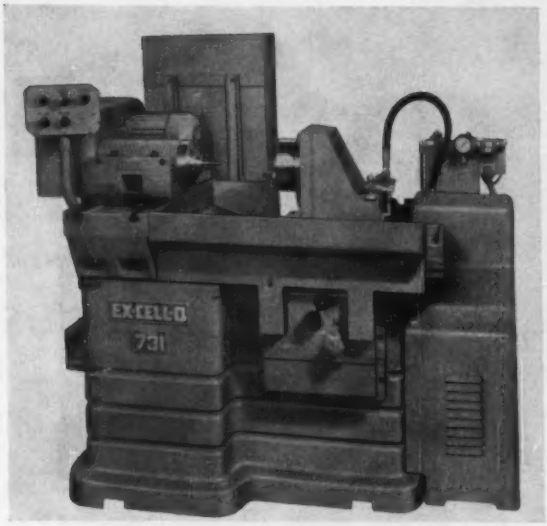


Fig. 3. Single-end boring machine for small parts

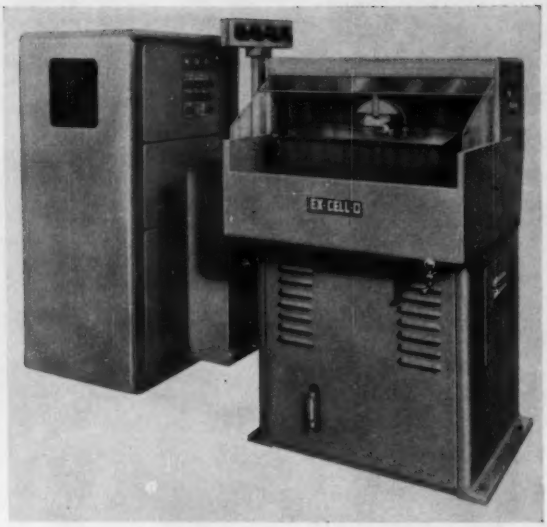


Fig. 4. Electrolytic tool grinder for carbides

A groove grinder, Model 973 (Fig. 6), is designed for precision plunge-grinding operations. With a variable wheel feed, spark-out and withdrawal controlled by positive cam action, and hydraulically operated cross-slide movements, the unit is fully automatic. Positive size control is assured through handwheel graduations of 0.0002 inch for cross-slide settings, automatic wheel-size compensation after setting, and a positive limit stop.

Though primarily a precision machine, Model 973 is equally as effective when it is used for roughing and semifinishing operations.

Visitors interested in drilling, piercing, trepanning, or cavity-sinking operations in extremely hard and conductive materials will find the Model 244 vertical Electrospark machine (Fig. 7) fascinating, as relatively soft tools are used to cut intricate shapes with little wear. A high-amperage current is passed between the tool (which acts as the negative electrode) and the work (which acts as the positive electrode). When both are brought into close proximity while submerged in a dielectric bath, 40,000 electrical impulses per second remove particles of work, forming an inverse image of the tool.

A vertical machine, Model 411 (Fig. 8), is designed for precision turning, boring, facing, grooving, and chamfering operations on medium-size parts. It is of single-column construction, and has a counterbalanced, hydraulically operated compound slide. Using basic components, seven different arrangements of the equipment are possible. Spindle drive motors can be mounted on either the left or right, single- and double-spindle

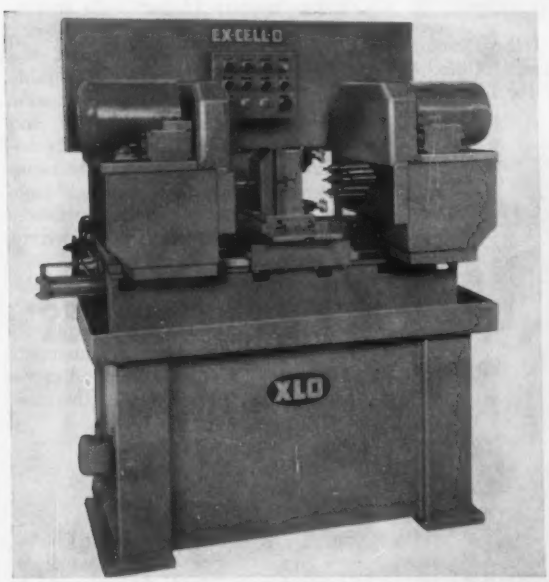


Fig. 5. Boring machine with interchangeable spindle plates

Fig. 6. Groove grinder with positive cam-action control

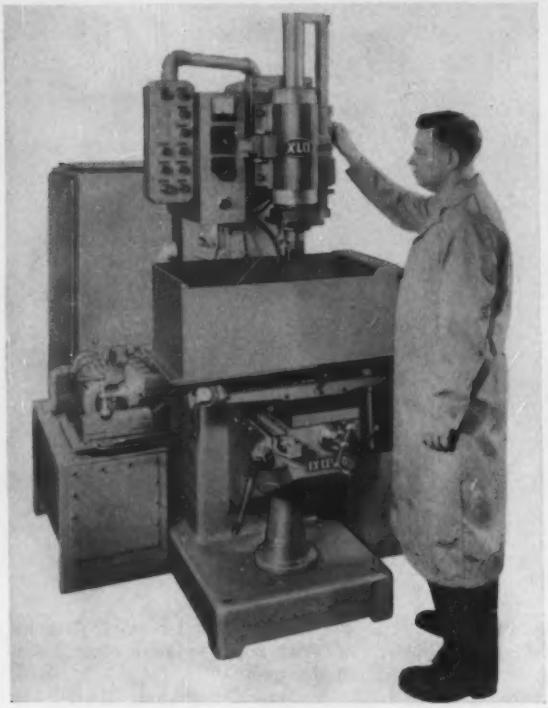


Fig. 7. Vertical Electrospark machine uses soft tools for intricate shapes

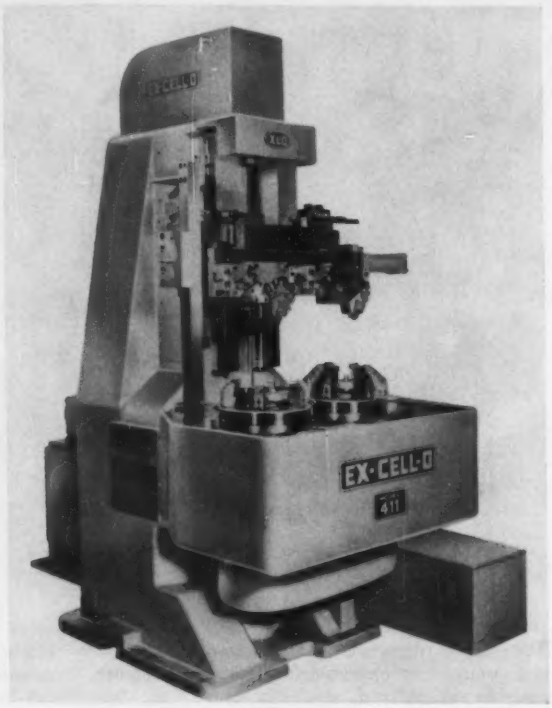


Fig. 8. Versatile boring machine provides seven arrangements of basic components

combinations can be employed, and two or more machines combined for multiple operation. Easy tool changing and adjusting, and easy and safe loading are other features.

The Ex-Cell-O exhibit will also include two cam-operated machines, Models 308 and 312, for producing accurate contours.

Circle 607 on Readers' Service Card

Latest Cincinnati Press Brakes, Shears, and Shapers

Booth 1230

All machines will be operating, and a variety of work types will nearly reproduce job conditions, at the exhibit booth of the Cincinnati Shaper Co., Cincinnati, Ohio. Adjustable rake is, for the first time, a standard feature of the new Series 4312H hydraulic plate shear (Fig. 1). The upper knife, adjustable from 0- to 3/4-inch taper per foot, permits the shearing of sheets from relatively thin material. But it will also shear a 3/4-inch plate of mild steel 6 feet wide at 3/4-inch rake, or a 1/2-inch plate 12 feet wide at 3/8-inch rake.

The ram is inclined and the throat depth is 18 inches. The table has ball transfers. The hydraulic hold-downs are ring-packed and flange-mounted. Lubrication is automatic, under pressure. A light beam gages shearing and the back gage has a 48-inch range with the power adjustment controlled from the front of the machine.

The first practical solution to the problem of how to bend slowly with high-speed cycling of the ram will be demonstrated by the Cincinnati 9 series × 10-foot automatic cycle press brake, Fig. 2. Using this ma-

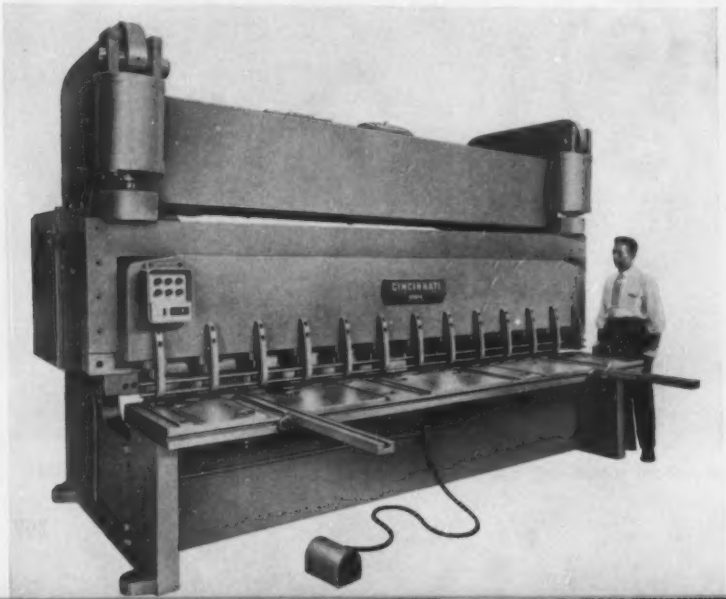


Fig. 1. The hydraulic drive of Cincinnati Shaper Series 4312H plate shear offers adjustable knife rake as a standard feature for the first time

chine, a smooth, even flow of ram power produces identical bends at each stroke, eliminating troublesome back-bends and whip-ups of the free end of the sheet. Where die length permits, the press brake will bend a 1/4-inch sheet of mild steel 13 feet wide.

The machine that will be on demonstration at the exhibit will have automatic cycle control, a two-speed transmission (choice of thirty or seven strokes per minute), dual clutches with air-electric control, fail-safe brake, six control positions with lock-out, and twin micrometer ram adjustment with read-out indicators on the right-hand end for fast, accurate settings. The power ram adjustment is push-button operated, has an automatic lock on the ram screw, and provision is made for quickly tilting the ram when the bend must fade out.

Something different in a production shear for sheet materials will handle mild steel of 10 gage up to 5 feet wide. The Hi-Speed shear machine (Fig. 3) is fabricated from steel, has an underdrive, and will be shown working in conjunction with a 24-inch power reel and a rack-and-pinion power feeder in a prototype cut-to-length line. The line will make 125 shearing strokes per minute. It has a spring bar hold-down, a combination air clutch and brake, a double-rake upper knife, an inclined ram, and automatic pressure lubrication.

Operating at a 2-inch depth of cut at 0.030-inch cross-feed will be the company's 24-inch heavy-duty rigid shaper, Fig. 4. This machine has a 25-inch stroke, offers a choice of 9 to 119 strokes per minute, has a plain table with table support, automatic lubrication at 50 psi, an automatic tool lifter, power down-feed to the tool-head, and a power rapid traverse. The electromagnetic clutch and brake have no troublesome brushes. The internal transmission runs in an oil bath. There is direct reading on the controls of all movements and single adjustment of ram-stroke position. The ram has no slots and there are full-length tapered gibs on all important sliding surfaces.

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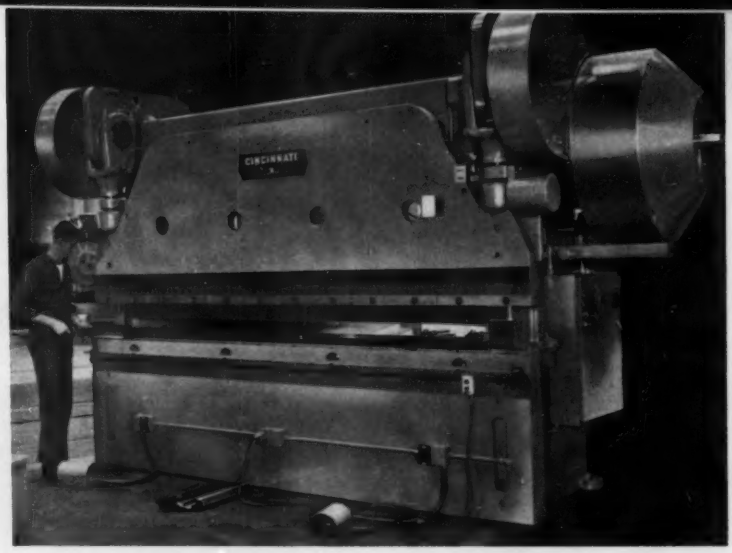


Fig. 2. New 9 series press brake solves the old problem of getting a slow-speed bend with fast ram cycle

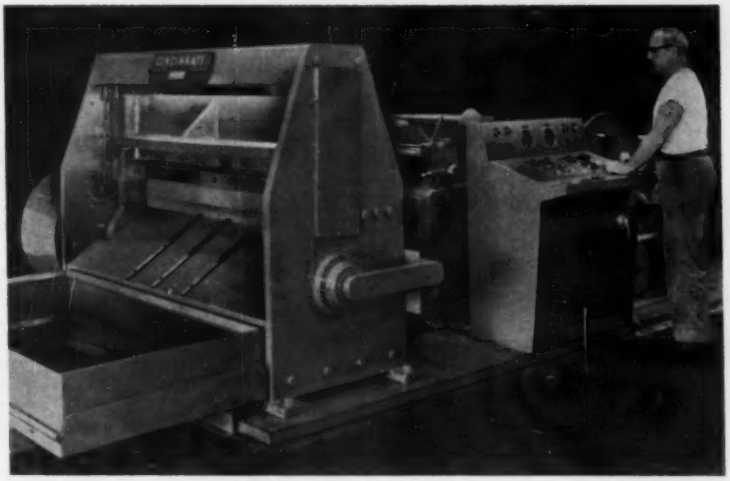


Fig. 3. A compact, cut-to-length sheet shearing line will incorporate the 200-stroke-per-minute Hi-Speed shear (left)

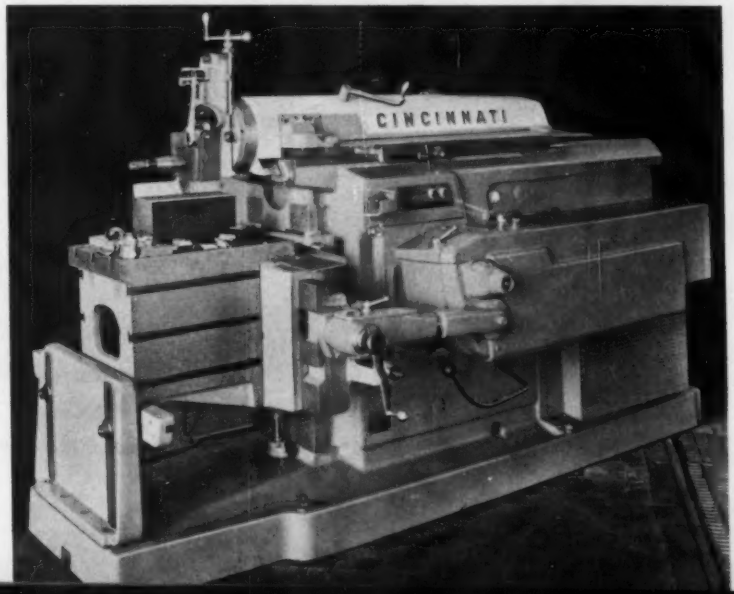
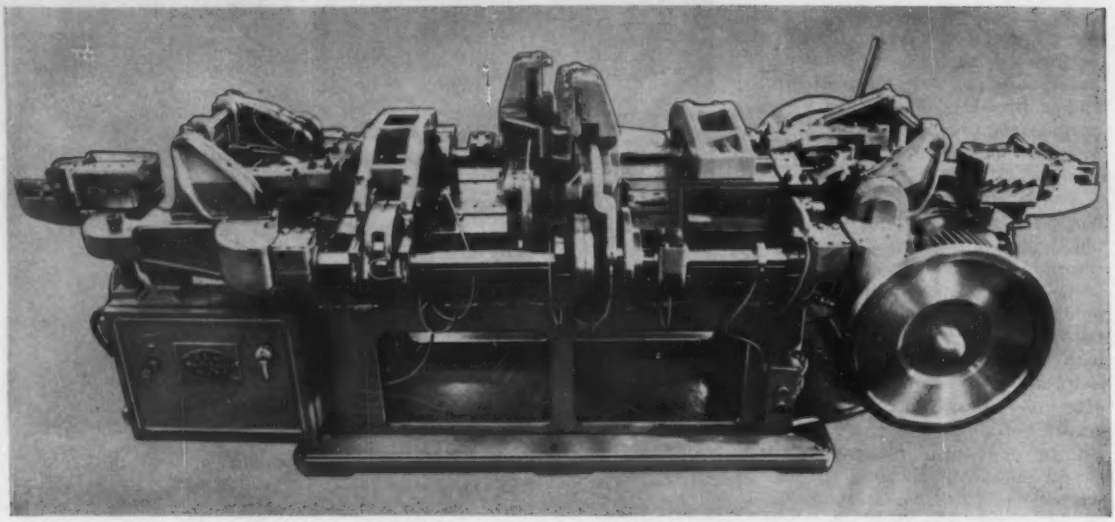


Fig. 4. Ability to make a 2-inch depth cut with a 0.030-inch cross-feed will be demonstrated by the 24-inch heavy-duty rigid shaper



Coil stock can be fed into this duplex four-slide machine at each end. Parts are formed by the tools, assembled on the central kingpin, and the assembly is removed by a common stripper

Duplex Four-Slide Machine Sparks U. S. Tool's Exhibit

Booth 842

The ability of one machine to precision-form and assemble two separate stampings will be displayed as one of the exhibits in the booth of the U. S. Tool Company, Inc., Ampere (East Orange), N. J. Duplex four-slide Model MS-36D is a double-ended machine. Stock from coils is fed in at both ends, one strip feeding in the left-to-right direction and the other in the right-to-left direction. This arrangement is ideally suited for the four-slide fabrication of assemblies. These could include two stampings (both made and assembled in the machine) or two stampings (both produced in the machine) assembled with a prefabricated, hopper-fed member. Also, the equipment can be used for making two entirely unrelated and different stampings (not requiring assembly) at the same time. If required, the duplex can also be employed in the manner of a standard multiple-slide machine by using one end only.

Currently, the duplex machine is made in one size, suitable for material up to 3 inches in width and feeding a stock length adjustable up to a maximum of 6 inches. The demonstration machine is arranged with two flat stock straighteners (one at each end), two slide feed mechanisms (one at each end), two stock checks (one at each end), one die-head (ram), 25-ton capacity at each end, one four-slide forming position, and one common kingpin stripper unit with double motion.

In addition, a Model MS-28H Multi-Slide of the company's conventional type will be shown arranged for 400 strokes per minute.

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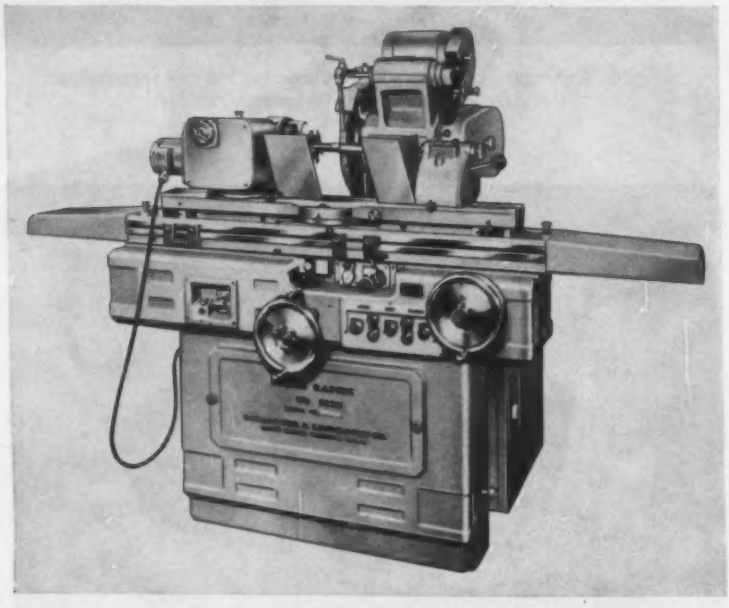

OD and ID grinder introduced by Gallmeyer & Livingston

Grand Rapids External and Internal Grinder

Booth 751

Gallmeyer & Livingston Co., Grand Rapids, Mich., will feature its No. 1230 universal grinder, designed primarily for plants having to do a wide variety of external and internal cylindrical grinding, but not in sufficient volume to justify the purchase of separate machines. The equipment is both rugged and accurate, capable of taking rough cuts as well as producing fine finishes.

The table is hydraulically operated at speeds from 3 ipm to 50 fpm. All hydraulic controls are conveniently grouped directly above the electrical control panel.

Men Responsible for Results in the Machine Tool Using Industries

J. A. Wettergreen, Vice-President, Manufacturing, Marion Power Shovel Co., Marion, Ohio.

Adrian O. Holmberg, Executive Vice-Pres., Mfg., Miehle-Goss-Dexter, Inc., Chicago, Ill.

G. T. Poirier, Plant Manager, Chrysler Corporation, Imperial Division, Dearborn, Mich.

Floyd J. Bird, Vice-President, Lycoming Division, Avco Corporation, Williamsport, Pa.

E. J. Dosing, Plt. Mgr., Gale Products Div., Outboard Marine Corporation, Galesburg, Ill.

G. A. Richroath, Vice-Pres., Mfg., Sperry Gyroscope Co., Div. Sperry Rand Corporation, Great Neck, N. Y.

Fred K. Godfrey, Vice-Pres., Dir. of Mfg., Weber Aircraft Corporation, Burbank, Calif.

E. R. O'Hara, Dir. of Mfg., Stromberg-Carlson Co., Div. of General Dynamics Corp., Rochester, N. Y.

John Ernst, Gen. Wks. Mgr., Tractor Group & Vice-Pres., Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Men Responsible for Results in the Machine Tool Using Industries

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E. C. Sedlack, Div. Mfg. Mgr., AGT Div., Westinghouse Electric Corporation, Kansas City, Mo.

Fred Osann, Jr., Gen. Mgr., Parts & Equip. Mfg. Div., Chrysler Corporation, Detroit, Mich.

O. Wiesemann, Manufacturing Manager, Caterpillar Tractor Co., Joliet, Illinois

I. A. Binder, Vice-Pres., Mfg., Ramo-Wooldridge Div., Thompson Ramo Wooldridge, Inc., Canoga Pk., Calif.

J. A. Grundy, Operating Vice-Pres., Reed Roller Bit Co., Houston, Texas.

B. E. Starr, Gen. Mfg. Mgr., Pontiac Motor Div., General Motors Corporation, Pontiac, Mich.

L. E. Batchelor, M.M., Aircraft Engrg. Oper., Allison Div., General Motors Corp., Indianapolis, Ind.

H. G. Warner, Vice-Pres., General Motors Corp. & Gen. Mgr., Cadillac Motor Car Div., Detroit, Mich.

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Dale W. Bachtel, Mfg. Mgr., AC Spark Plug Div., General Motors Corporation, Flint, Mich.

H. M. Dardani, Vice-President, Mfg., Miniature Precision Bearings, Inc., Keene, N. H.

C. B. Faverty, Vice-Pres., Mfg., Pullman-Standard Division, Pullman, Inc., Chicago, Ill.

Philip A. Larnino, Vice-President, Manufacturing, FWD Corporation, Clintonville, Wis.

H. J. Jacobi, President, Defense Products Division, Brunswick Corporation, Muskegon, Mich.

L. I. Woolson, V. P. & Div. Gen. Mgr., MoPar Parts & Acces. Div., Chrysler Corp., Detroit, Mich.

C. C. Logue, Jr., Mgr., Thompson Prod. Light Metals Div., Thompson Ramo Wooldridge, Inc., Cleveland.

Milton J. Kittler, Executive Vice-President, Holley Carburetor Co., Warren, Mich.

Men Responsible for Results in the Machine Tool Using Industries

H. E. Rice, Mgr. Mfg., Light Military Electronic Equip., General Electric Co., Utica, N. Y.

C. W. Marsh, Mgr. of Mfg., Watertown Div., The New York Air Brake Co., Watertown, N. Y.

Eibe W. Deck, Vice-President, Manufacturing, The Lunkenheimer Co., Cincinnati, Ohio.

Erle Martin, Vice-President, United Aircraft Corporation, East Hartford, Connecticut

John Roll, Works Manager, The Singer Manufacturing Co., Elizabeth, New Jersey

Joseph L. Kiraly, Works Manager, Brunswick Corporation, Muskegon, Michigan

T. F. Morrow, Group Vice-Pres., Defense & Special Products, Chrysler Corporation, Detroit, Mich.

C. A. Jurgensen, Vice-President of Manufacturing, DeLaval Steam Turbine Co., Trenton, N. J.

Gene Rommel, General Superintendent of Tooling, Evansville Div., Whirlpool Corp., Evansville, Ind.

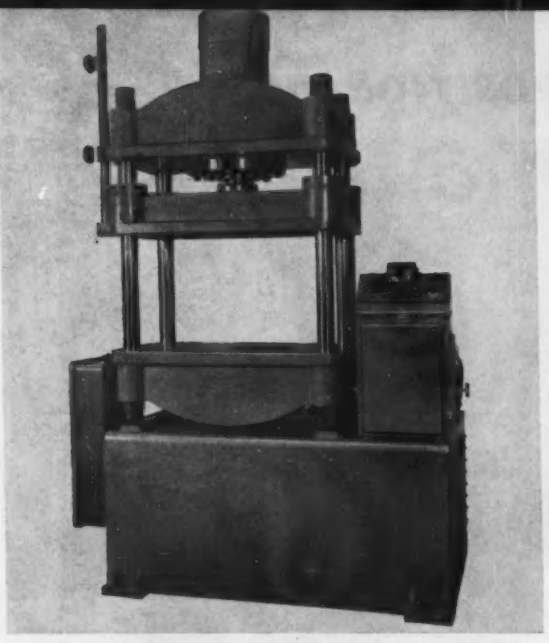

Fig. 1. Greenerd guided platen, 40-ton hydraulic press

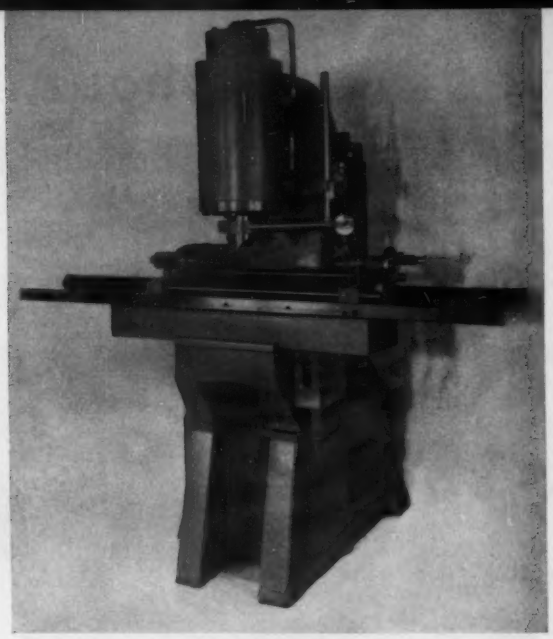

Fig. 2. Hydraulic press equipped with straightening table

Greenerd Hydraulic Presses, Arbor Presses, and Expanding Machines

Booth 541

Greenerd Arbor Press Co., Nashua, N. H., will exhibit five new machines added to its line of arbor presses, hydraulic presses, and metal-sizing equipment. Included will be the Model PD-440 hydraulic press seen in Fig. 1. Rated at 40 tons, this machine is a general-purpose, guided platen press for operations such as forming, bending, die tryout, and molding.

A second hydraulic press to be displayed is the Model H-15-D machine illustrated in Fig. 2. It is equipped with a straightening table and variable ram-pressure control combined with electrically operated ram control. The capacity of the unit is 15 tons. Also to be introduced is a Model HP-4-D self-contained, 4-ton hydraulic press, Fig. 3. This model is now available in 2-, 4-, 6-, 10-, and 15-ton sizes.

The Model 3-R lever ratchet type arbor press shown in Fig. 4 will be displayed. This press has a maximum pressure of 3 tons and can handle 12-inch diameter work. The daylight measurement of the press is 11 1/2 inches. It is useful for such operations as assembly, forming, and keyway broaching.

In addition, the company will exhibit two hydraulic expanding machines, the Model E-62 (maximum pull of ram 62 tons) and the E-93 (maximum pull of ram 93 tons). Both of these machines were described on page 248 of June, 1960, MACHINERY.

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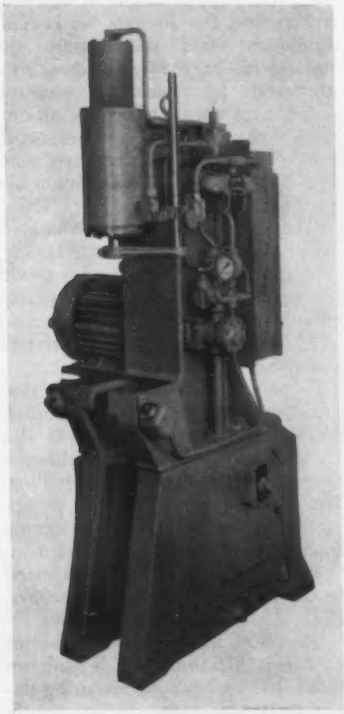
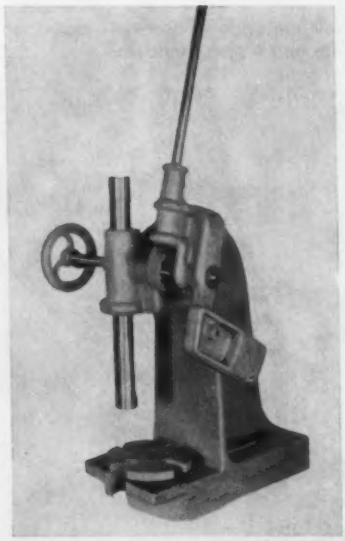


Fig. 3. (Left) Self-contained Model HP-4-D hydraulic press

Fig. 4. (Below) Greenerd 3-ton lever ratchet type arbor press

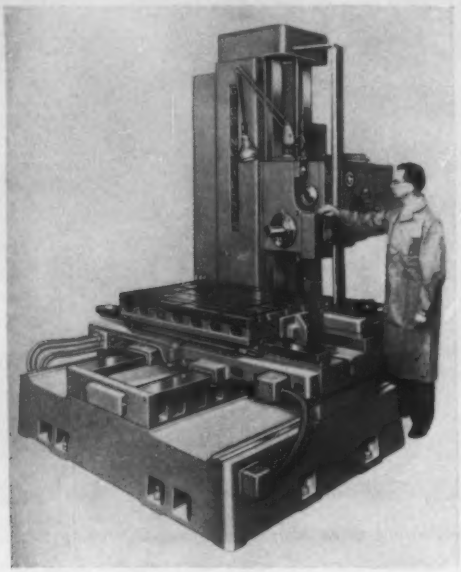


K. R. Wilson Compacting and Trimming Presses

Booth 1444

Three presses will be introduced by K. R. Wilson, Inc., Arcade, N. Y. One is a 100-ton, opposed-ram, fully automatic hydraulic compacting press. It will demonstrate compacting refractory powder. Equipment includes a shuttle feed, automatic lubricator, and hopper mechanism. A second press is a 20-ton four-column high-speed unit for trimming die castings, and rubber or plastic parts. The third is a general-purpose, self-contained press, rated at 200 tons.

Circle 611 on Readers' Service Card



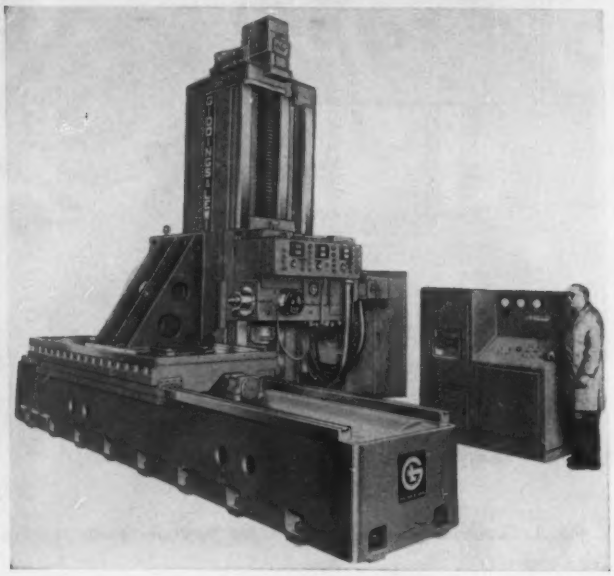


Fig. 1. (Left) Point-to-point punched tape and dial positioning will control 3-inch horizontal jig borer and milling machine. Fig. 2. (Right) Horizontal die sinker with magnetic tape control will be shown generating contours in large forging die-blocks

Numerical Controls, Six New Machine Models Highlight Giddings & Lewis Demonstrations

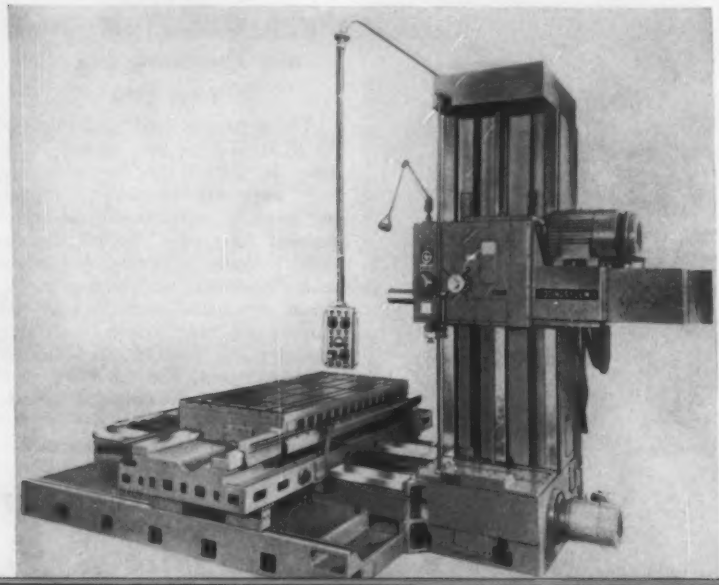
Booth 1320

A million dollars worth of machine tools and numerical positioning controls will be displayed under power in the exhibit of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. Of the fifteen machines to be displayed, six are new models this year. Two in the latter group are new types of machines—one a Numeripath-controlled horizontal die sinking and contour milling machine, the other a Numeripoint-controlled jig borer and milling machine. All the other machines exhibited incorporate major new design improvements.

A precision horizontal jig borer with heavy-duty milling capabilities, Fig. 1, will be demonstrated with the company's Numeripoint punched tape or dial-in controls. Jigless boring and heavy face milling operations will be shown cutting metal. Saddle feeds for long-bore accuracy, joy-stick controls, remote operation, hardened ways, and antifriction saddle supports are a few of the outstanding features of this machine, designated as No. 3.

A horizontal milling machine, No. B-20 DiMil (Fig. 2), will be shown with Numeripath magnetic tape control system for contour work. This equipment will demonstrate the sinking of large forging dies, programmed by numerical control. Antifriction way surfaces for all motions, complete remote control, extra-heavy three-way column, and massive bed and table construction are outstanding features.

Fig. 3. Tape, dial-in, and pendant controls are optional on new 5-inch horizontal boring, drilling, milling, and tapping machine



The No. 65-H5-T horizontal—a 5-inch spindle horizontal boring, drilling, and milling machine—will be running, equipped to operate either with a Numeripoint punched tape, or by dial-in control system and saddle depth positioning, Fig. 3. This machine will automatically perform milling, positioning, boring, drilling, and tapping; and will also demonstrate step boring, continuous facing, and full-horsepower milling. The remote pendant controls clamping, independent milling and boring feeds, and also offers joy-stick control. Other features are a motorized headstock, a column with three ways, and a heavy bed with four ways.

Illustrated in Fig. 4 is a Giddings & Lewis/Bickford 9-inch column radial drilling machine featuring automatic tapping reverse by simple

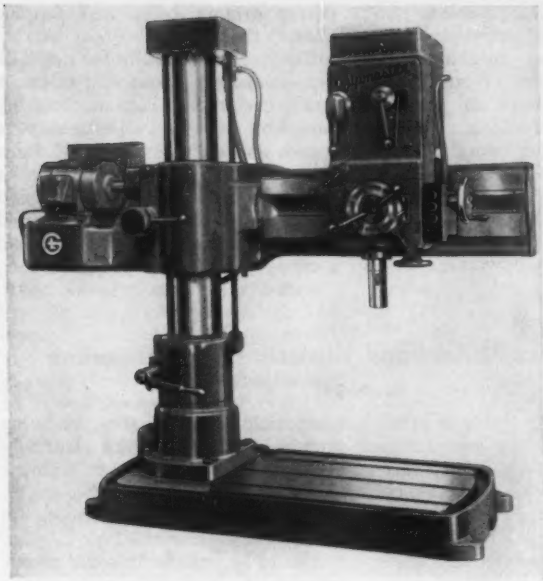


Fig. 4. Automatic tapping reverse, by simple dial control, is a feature of the 9-inch column radial drill

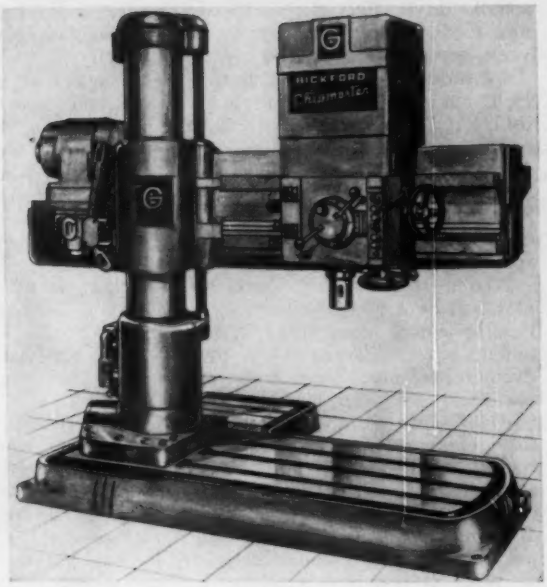


Fig. 5. The head of the G&L/Bickford 11-inch radial drill can be fitted with automatic cycling

dial control, single levers for speed and feed changes, and extra heavy-duty spindle, arm, and column. On exhibit for the first time, this machine will be demonstrated drilling and tapping in cast iron, using drill sizes up to 2 inches in diameter. A companion newcomer will be Giddings & Lewis/Bickford 11-inch column radial drilling machine, Fig. 5, featuring heavy-duty construction. The head is of novel design—offering automatic tapping reverse, twelve speeds, and nine feeds—and is arranged for the addition of automatic cycling as an accessory. The machine will demonstrate the drilling and tapping of holes up to 2 1/2 inches in diameter.

Introducing the company's Super Service line will be the 30-inch upright drill, Fig. 6, a 10-hp machine described as embodying a new concept in drilling machines. The

Fig. 6. First entry in new Super Service line is a 30-inch upright drill with 10-hp drive

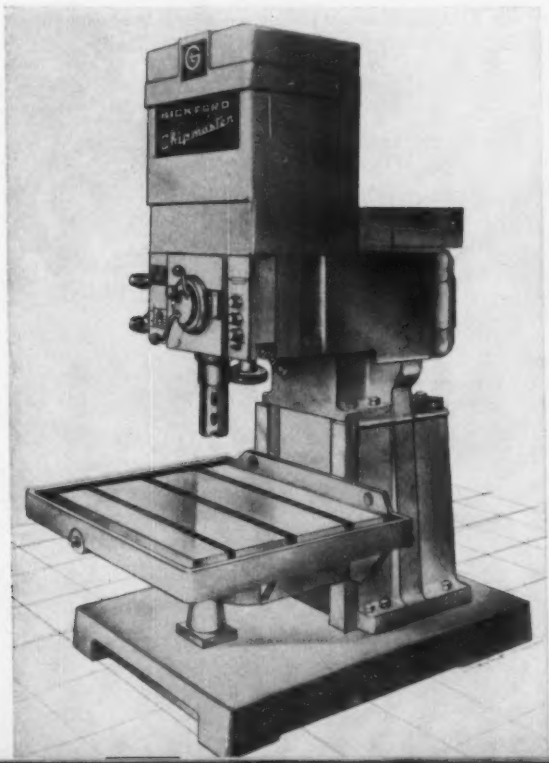
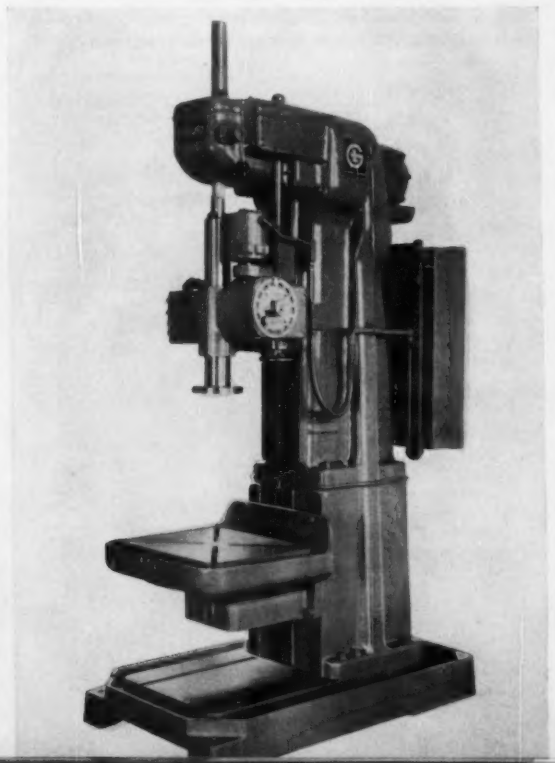


Fig. 7. Automatic drilling and tapping is efficient on the new 28-inch automatic production drill



spindle drive offers twelve speeds, nine feeds, an automatic tapping reverse, and a dwell type feed trip.

Featuring a new dial set, the 28-inch, automatic production upright drill, Fig. 7, provides cycling spindle control for automatic drilling, or it will combine automatic drilling with automatic tapping. The Chicago demonstration will have this machine under power with an eight-spindle head attachment.

Also in the Giddings & Lewis display will be a 4-inch spindle, table type horizontal boring, drilling, and milling machine designed for production and precision manufacturing operations. The machine, No. 65-D4-T (not shown), features a scale reference offset, fast directional controls, and independent feeds to all motions. A 42-inch, vertical turret lathe will be demonstrated under Numeripoint punched tape control to illustrate its capabilities in all types of turning operations. It offers automatic tool indexing; automatic speed and feed settings; and built-in tool adjustment for turning, boring, grooving, facing, taper-turning, and thread-cutting operations.

Part of the company's exhibit will be a heavy-duty vertical boring and turning mill, the 8-foot VBM, which has an electronic read-out measuring system and full pendant control.

A new concept in the construction and operation of a horizontal boring, drilling, and milling machine offers an advanced approach to boring mill machining techniques. The 5-inch floor type machine will be operated under Numeripoint punched tape control to perform face milling, end-milling, boring, drilling, and tapping operations automatically. Also on display will be the Giddings & Lewis/Bickford 15-inch radial drill. Designed for stringent economy in the manufacturing phase of metalworking production, it will be run under full power drilling holes and tapping Class 3 threads.

Designed specifically for use with tape-controlled positioning tables, a newly designed drilling machine has complete preselection of thirty-six speeds and eighteen feeds. The machine will be demonstrated under power with Numeripoint-controlled positioning table that offers a rapid traverse movement of 360 ipm and a capacity of 10,000 pounds.

Circle 612 on Readers' Service Card

Van Norman Millers and Miniature Parts Grinders

Booth 351

Unparalleled in its ability to grind inner races of miniature bearings to tolerances of less than 0.000050 inch with approximately a 3-micro-inch finish, a new precision ball-bearing race grinder, Fig. 1, will be exhibited by Van Norman Machine Co., division of Van Norman Industries, Inc., Springfield, Mass. Called the Lectro-Cam Model 1-M superprecision ball-bearing race grinder, the unit has produced bearing races to 7ABEC tolerances on a 0.062-inch outside diameter with a ball radius of 0.0165 inch.

The machine's industry-integrated design provides high-speed productivity at lower cost. The engineering of the 1-M race grinder resulted from a study of major bearing manufacturers, who revealed the need for a machine that would be compatible in size to the part being ground, that would be basically mechanical, and which would afford simplification and standardization of tooling to enable setup time to be minimized.

Also to be unveiled for first showing are two ram type milling machines, Fig. 2. The new machines have spindle-drive motors located within the all-geared ram to provide maximum cutting power and sharper product configuration. The ram is rigid in either retracted or extended position. Centered alignment of spindle, table, knee, and knee slide provides increased accuracy and over-all range. Designated Models 1R-22-3 and 1RQ-22-3, designs of the new machines are based on the company's 16 series and supplant Models 16M and 16S, respectively.

Fig. 1. Designed for miniature bearing work, Lectro-Cam grinds ball tracks in inner or outer raceways

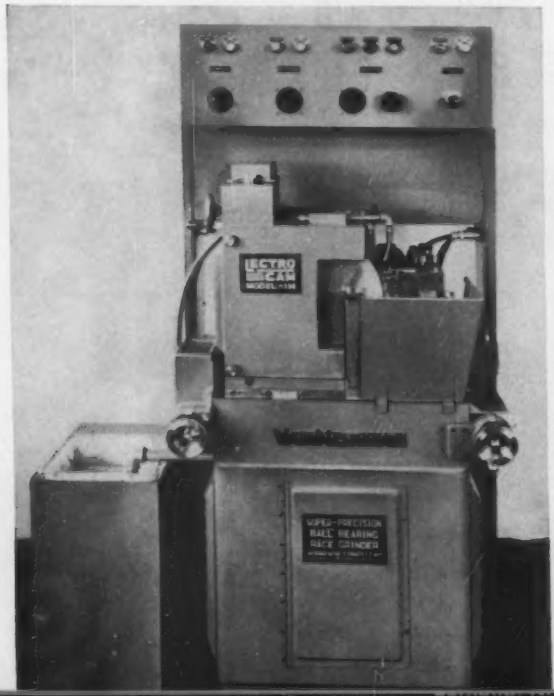
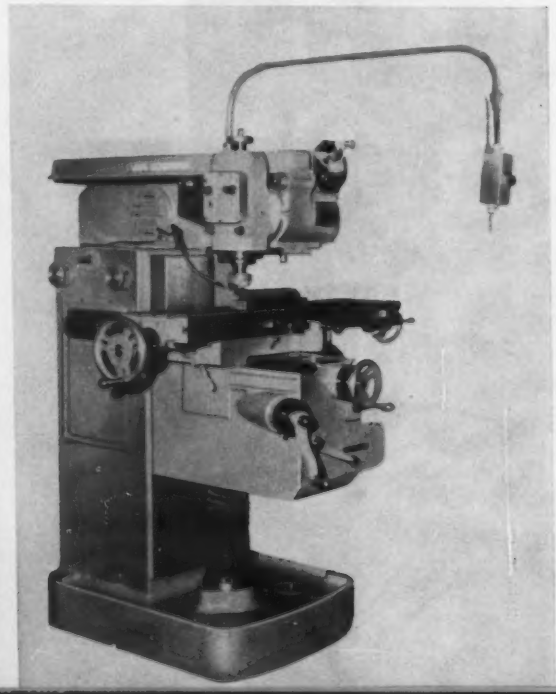


Fig. 2. Medium-weight milling machine is built with either heavy-duty or quill type cutter-head



Equipped with a heavy-duty adjustable cutter-head for horizontal, angular, and vertical milling without disturbing the original setup, the 1R-22-3 fills a gap in the milling market resulting from the lack of a medium-weight machine. The unit features an expanded range with increased clearance under the spindle in either horizontal or vertical position of the cutter-head.

Model 1RQ is equipped with a quill type, adjustable cutter-head that permits drilling, boring, and reaming in addition to horizontal, angular, and vertical milling; optical verniers for precision boring; and a centered cross-feed screw that provides maximum stability. Its spindle speeds are 100 to 3600 rpm.

The Van Norman 418 cylindrical grinder, Fig. 3, offers several important design advancements in the form of optional accessories, which permit crush-forming and live or dead center operation. In addition, an optional sure-set taper-indicating gage allows exact swivel table adjustment to eliminate taper or to produce a specific taper.

Circle 613 on Readers' Service Card

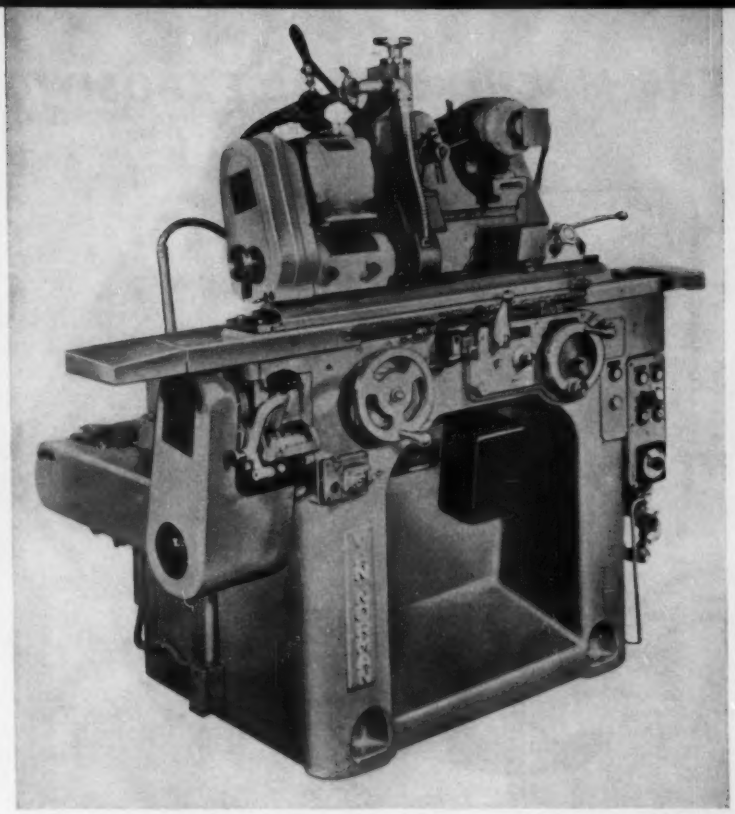


Fig. 3. Model 418 cylindrical grinder offers a new crush-forming accessory and live or dead center operations

Frauenthal Grinding and Turning Machines

Booth 1220

Four standard and one custom series of precision machines for conventional and contour grinding and turning will be demonstrated by the Frauenthal Division, Kaydon Engineering Corporation, Muskegon, Mich. These machines utilize vertical design to eliminate the deflection encountered when large unsupported parts are processed in a horizontal position. Vertical design also permits easier loading, faster checking of work, reduced floor-to-floor time, and faster centering of parts such as large rings. All are available with tracer, numerical, or manual control.

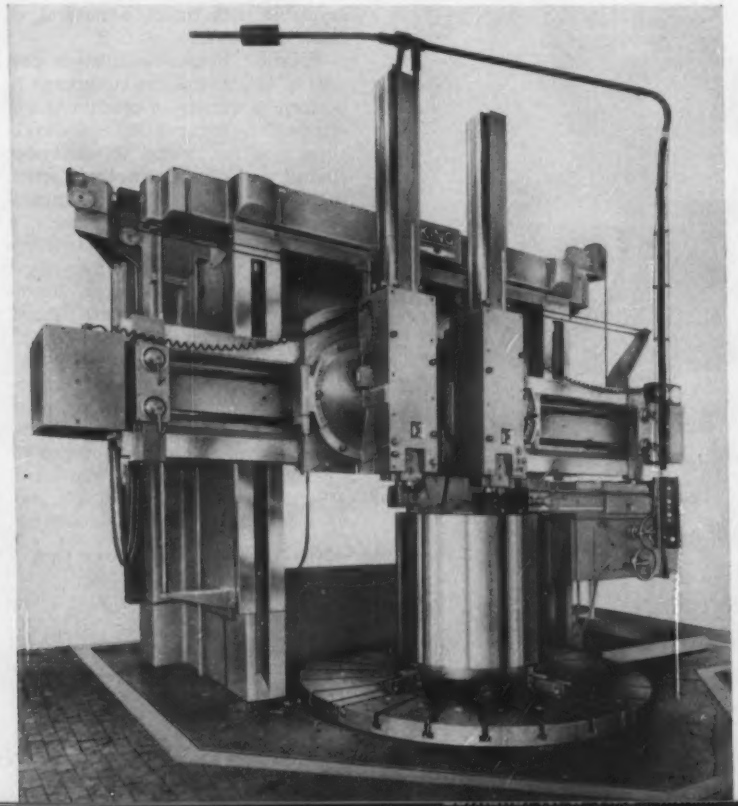
Building block construction permits adaptation of the equipment to perform a variety of machining operations. Features include a direct-current drive with potentiometer control, for varying the table speed to maintain a constant stock-removal rate on all surfaces of the work; a fabricated steel table ground flat by the machine itself; and a four-speed transmission for maximum horsepower through the entire speed range. To eliminate stick-slip and assure precise locating of the vertical and horizontal slides, recirculating roller bearing units are used on all way surfaces. Bearings are designed to provide instant reaction to a minimum of command. Hardened ways are protected against grit and chips with accordion type covers.

Circle 614 on Readers' Service Card

Frauenthal single-spindle grinder of vertical design with 52-inch swing

Fig. 1. Pendant control, with or without automatic tracer, is available on the new 46-inch King vertical boring mill

Fig. 2. Massive turning jobs can be remotely controlled from a pendant station of the Electrol system on this 120-inch boring machine



King Boring Mills—Elmes Presses Demonstrate Productivity and Economy

Booth 1406

Thirteen different machines will be operating on boring mill and hydraulic press applications to show the cost-reducing productivity of machines built by the Elmes/King Division of American Steel Foundries, Cincinnati, Ohio.

Latest developments in automatic control of vertical boring mills are shown in a production machining setup on a 46-inch King Ultra-Matic machine, Fig. 1. The equipment features the King "Ultra-Matic" programming device which provides automatic control of a full cycle of machining operations. The sequence of movements for each head on the machine is set in an individual "patchboard" by means of jumper cords. The board is then placed in the control console which contains the automatic-cycling electrical controls. With patchboards and tools in place, stop-blocks are set on vertical and horizontal rod assemblies to control the corresponding movements of each head. The full cycle—including feed selection and change; speed selection and change; head movements; turret indexes; coolant pump on-and-off; and all other necessary functions for machining—is automatically controlled.

The ram head on this machine has a General Electric electronic tracer, providing two-dimensional 360-degree tracing operation. The machine has constant chip-thickness control interlocked with the constant surface speed control of the table. Thus, the movement of the tool-slide across the work-piece will maintain constant cutting speed and will hold the preset feed rate for all changes of table speed. This combination is a prerequisite for producing a high degree of finish.

Full electrical control of all machining functions from a convenient pendant station is afforded on King Electrol machines, throughout a complete line of sizes from 30 inches to 168 inches and up, typified by a 120-inch machine, Fig. 2. This huge mill has two ram heads with push-button controlled power swiveling, and features the new "package design" variable-speed drive with individual console.

Two standard Elmes C-frame presses, incorporating the latest design improvements, will be under power. The 100-ton model, Fig. 3, will be tooled and in operation on a bar-straightening job, the other is a

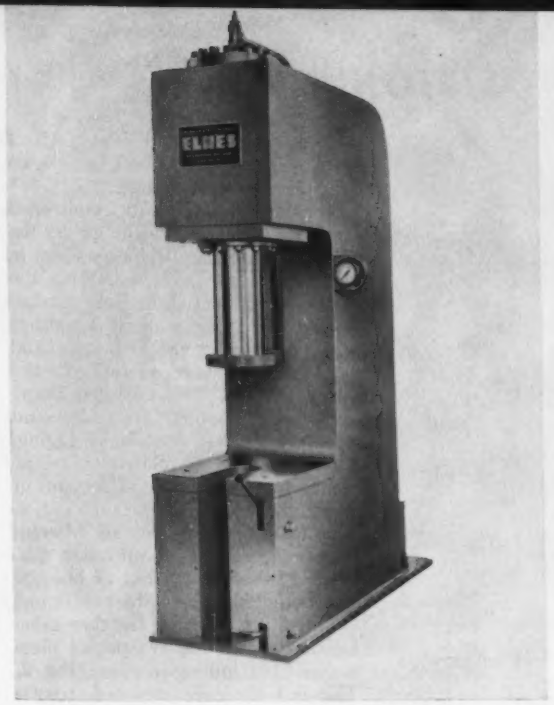


Fig. 3. Tooled and in operation, the latest model Elmes 100-ton C-frame press will be straightening bars

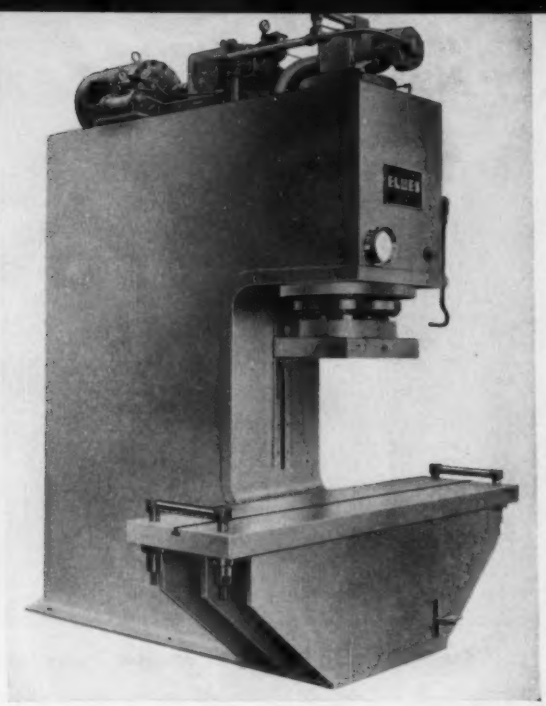


Fig. 4. Easy adaptability and sensitivity to controls are characteristics of the 200-ton C-frame hydraulic press

200-ton press, Fig. 4, of extremely practical utility.

The C-frame machines afford wide flexibility for building-block adaptation to specialized requirements. One relatively common modification is a C-frame unit combining two cylinders in a single frame for straightening and forming work. In this specialized press, one cylinder assembly is operated vertically and the other horizontally. Both may be operated in unison, or each may be operated individually.

Fully hydraulic, the Elmes 400-ton bulldozer, Fig. 5, incorporates simplified operating controls, as well as quick and easy change-over. Gages, pumps, and piping do not protrude above the main press members, yet everything is conveniently accessible for visibility and low-cost maintenance. Die space is ample and easy to get at, providing versatility to handle a wide range of pressing jobs. The design is available in many different capacities with bed size, stroke, and speed optional.

Offering timed compression and decompression cycling control, Elmes'-1000-ton hobbing press, Fig. 6,

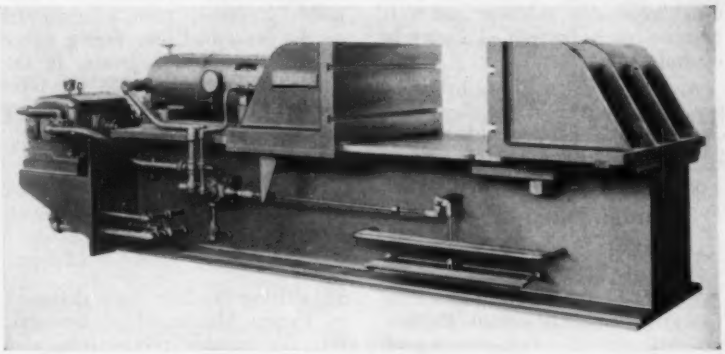


Fig. 5. (Above center) Elmes 400-ton bulldozer has all gages, pumps, and piping below main press members, out of the way of crane-handled loads

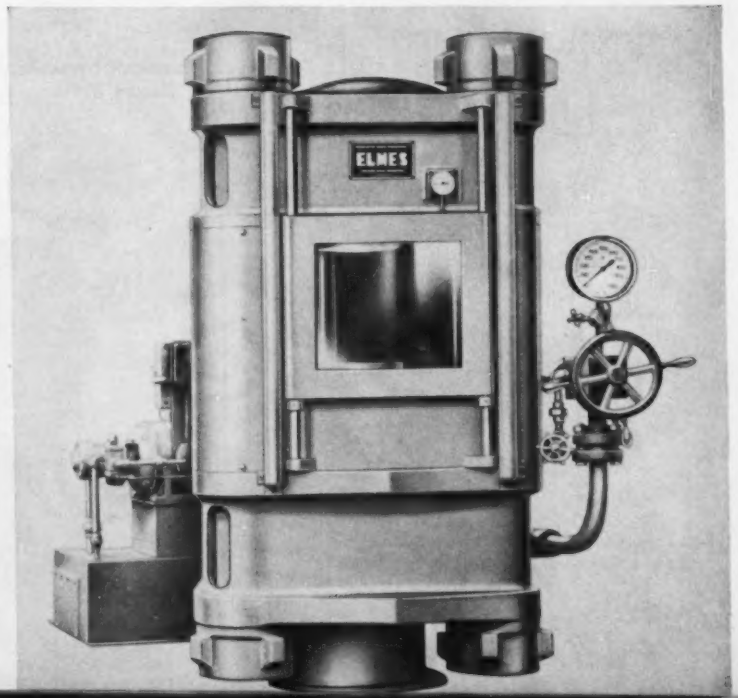


Fig. 6. (Right) Hot-forming of powder-metal parts is now possible on the timed-cycle 1000-ton hobbing press

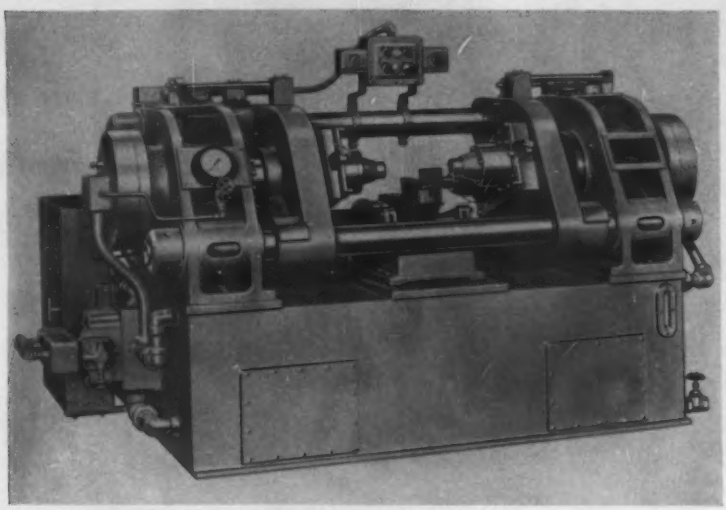


Fig. 7. Elmes opposed-cylinder press assembles heavy track links for crawlers

is now easily adaptable to compacting powder metals, atomic energy applications, and the making of synthetics requiring high pressures and temperatures. It will also do the usual impression hobbing jobs well, because of its simplified hydraulic control system.

A special design Elmes hydraulic press will be seen at the Show producing track-link assemblies. This 250-ton unit (Fig. 7) is claimed to be the largest of its type for production operation in assembling track links, bushings, and pins for crawler vehicles. This two-station transfer machine is fully hydraulic. Two horizontally opposed rams are mounted on the press bed, one facing either side of the transfer fixture. In the automatic assembly cycle, the links are fed from station to station by a shuttle carriage.

Circle 615 on Readers' Service Card

Famco Introduces Four Additions to Machine Lines

Booth 331

Visitors to the National Machine Tool Builders' Association Exposition will view the first showing of cost-cutting machine tools designed by Famco Machine Co., Kenosha, Wis., to increase productivity and operator comfort and safety. All of the new equipment will be operating on production work.

Famco's numerically controlled mill, Fig. 1, automatically guides the movement of the machine's slides in all three axes, thus eliminating the errors and limitations of manual positioning. The numerical settings are taken from original data and transferred by the operator to the control system. The time-consuming jobs of positioning templates and tools, laying out cuts, hand gaging, and checking are eliminated. Furthermore, there is a reduction of scrap and rework losses, preparation time, and plant investments inherent in using a digitally controlled machine. Users are assured of boosted productivity and consistent accuracy.

Operating nearby in the same booth will be the company's electrohydraulic milling machine, Fig. 2. This is a three-dimensioned, tracer-operated unit of advanced design. All motions are by precisely controlled hydraulic cylinders.

A new line of small C-frame hydraulic presses will be unveiled. Of five tonnage ratings—2, 3, 4, 6, and 10—they have the same basic frame design, proportioned for the greatest rigidity, the least deflection, and ample die area. The control panel of each press contains motor starter stations, easily readable gages, and a relief-valve pressure adjustment knob. With this entry into the hydraulic press field, Famco claims to be the sole builder offering the full range—manual, mechanical, air, and hydraulic presses.

Famco's 10-foot, heavy-duty power squaring shear, Fig. 4, is con-

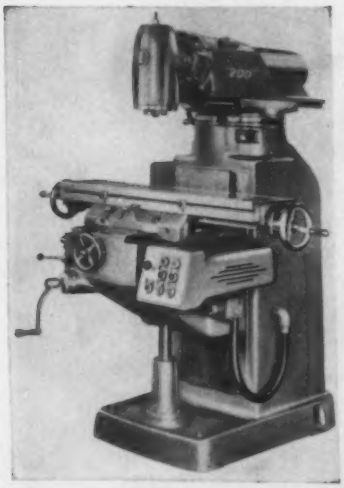
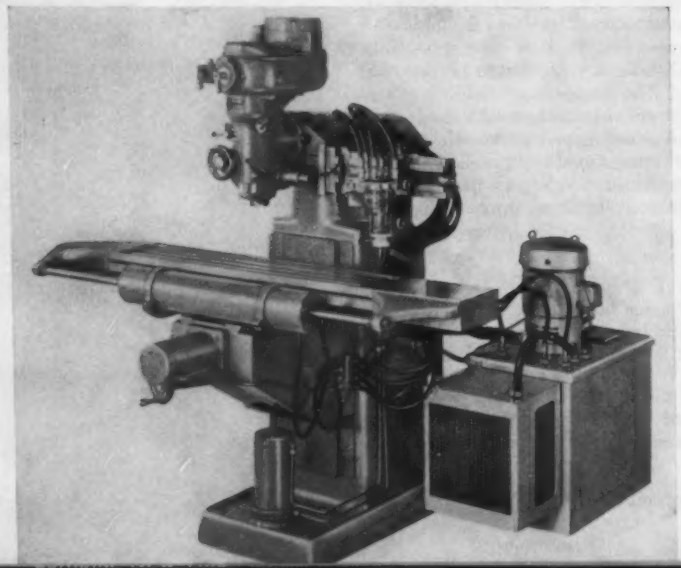
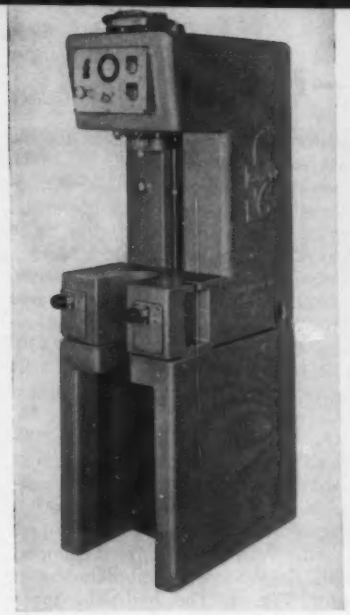


Fig. 1. Famco milling machine has three-axis numerical control

Fig. 2. Three-axis hydraulic tracer control is an outstanding feature of Famco's electrohydraulic mill





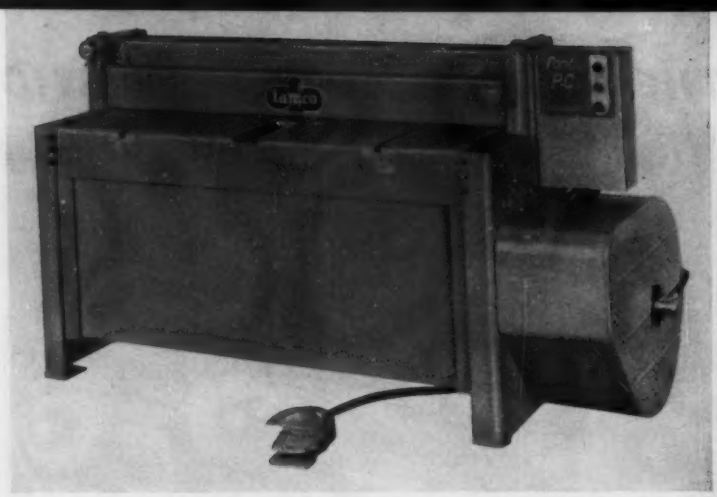


Fig. 3. (Left) A series of five C-frame hydraulic presses fills out Famco's line
Fig. 4. (Above) Heavy-duty, 10-foot shear blade has four ground cutting edges

structed entirely of steel. It has a silent worm-gear transmission and air-friction clutch and brake that is self-compensating for wear. Bronze gib bearings provide a total of 224 square inches of bearing area to guide the cross-head accurately. Knives are made in a choice of two grades of high-quality alloy tool steel. They are ground with four edges. The knives can be turned when dull, giving four times more cutting life than single-edged knives.

Circle 616 on Readers' Service Card

Flexibility in Numerically Controlled Drills Demonstrated by Burgmaster Machines

Booth 842

In actual production demonstrations, the Burg Tool Mfg. Co., Inc., Gardena, Calif., will show how modern machining methods can drastically reduce production costs. In its exhibit of thirteen machines, seven will be numerically controlled turret drilling, tapping, and boring machines incorporating the latest advances in two- and three-axis systems of numerical control. Also included will be three automatic hydraulic turret drills and three manually operated Burgmaster machines. The Burgmaster exhibit offers three new models and many mechanical improvements in existing models.

One of the two recently added numerically controlled machines is a double-housing, planer type, eight-spindle turret drill. A 48-inch by 60-inch positioning table greatly extends the capacity of this class of machine to perform fully automatic machining operations. The other, a new Burgmaster 6-spindle turret drill, Fig. 1, introduces an intermediate size machine with three-axis control.

The new model 25 AH machine, Fig. 2, expands the line of automatic hydraulic drills. Improvements are constant-positive hydraulic feed with dial set; direct constant-reading electric feed indicator; temperature regulation of hydraulic fluid to insure accurate feed rates under all conditions; and a lead-screw tapping head that greatly improves the finish and accuracy of tapped threads and eliminates rejects resulting from pulled or loose threads.

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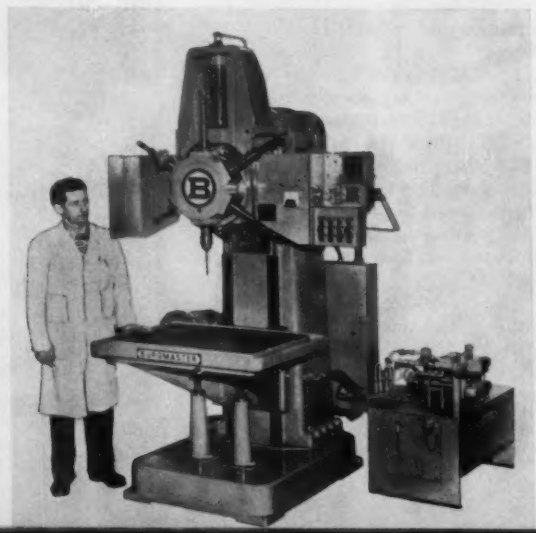
Fig. 1. Turret drilling machine with three-axis digital control in a medium-size six-spindle unit

Fig. 2. Sequenced hydraulically operated turret drill affords improved tapping of threads



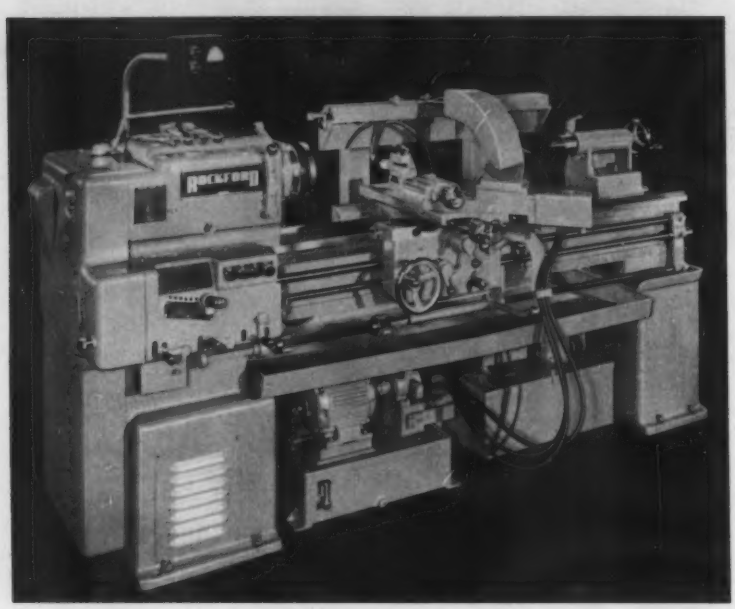


Fig. 1. Rockford 18-inch lathe equipped with Kopy-Kat duplicator

Rockford Lathe, Shapers, and Roll-Forming Equipment

Booth 1001

Rockford Machine Tool Co., Rockford, Ill., will show an 18-inch by 8-foot lathe equipped with a Kopy-Kat duplicator, Fig. 1. This production machine features an overhead tracer control with a flat master carrier (round master optional); a self-contained, accessible hydraulic unit; a duplicator slide that can be quickly changed over to a standard slide and compound for manual turning; and a European toolpost on the compound. Basically an all geared-head engine lathe, the machine has twelve spindle speeds (up to 1206 rpm) and thirty-two feeds. It can be used for heavy production work, as well as for toolroom or job shop work. The tracer control will permit tracing to within 0.001 inch.

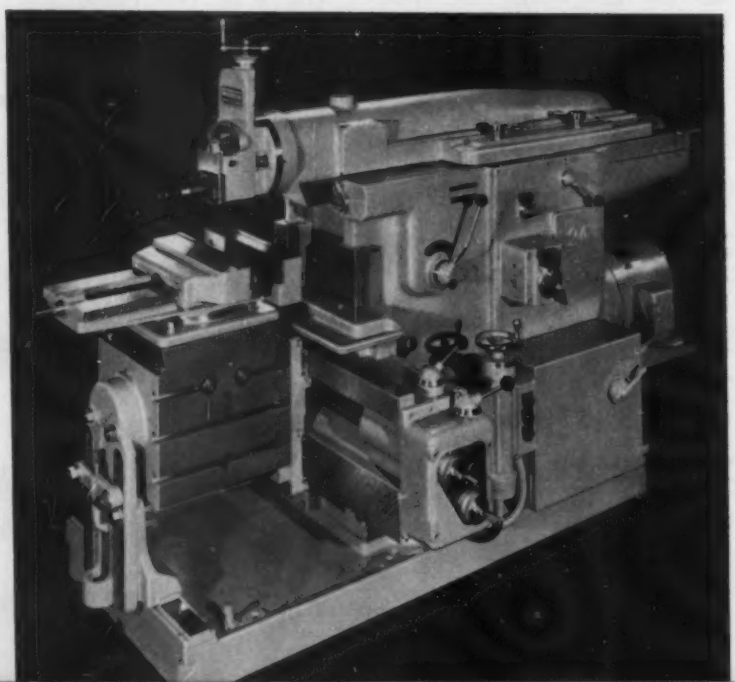
A 24-inch special Rockford Hy-Draulic shaper will be displayed. This machine (Fig. 2) has a hydraulic drive that provides infinitely variable constant cutting speeds and feeds and independent return speeds. Ram stroke settings are easily adjustable. It has been improved by the addition of limit switches to the ends of the cross-rail to prevent the operator from traversing the saddle into the cross-rail end and jamming the screw and nut.

The Maplewood N-MR-12 roll-forming machine (Fig. 3) and the Model 2 high-speed cutoff machine make one production unit for roll-forming a large variety of sections such as lock-seam tubing, aluminum window screen sections, and aluminum siding. Designed for heavy-duty production, the roll-forming machine has a magnetic starter, two push-button stations, a full-length jog bar, a direct chain drive with double power take-off, and a micrometer dial type individual upper spindle adjustment. Other features include: 40- to 120-fpm forming speeds; twelve forming stations; 1 1/2-inch diameter spindles; and a 5-hp, 3-phase, 220/440-volt, variable speed motor with a holding brake. The Model 2 high-speed cutoff machine, designed for continuous production operations, has a welded steel frame with an adjustable base for positioning; a 1 1/2-hp, 3-phase, 220/440-volt motor; and an air clutch and brake. It has a 2-inch stroke and a crankshaft speed of 176 rpm.

A 15-hp hydraulic circuit, 200-fpm cutting and return speeds, and a duplicator incorporated in the machine bed are some of the design features of the 72-inch model Hy-Draulic open-side shaper equipped with Kopy-Kat rail template duplicator, Fig. 4. The hydraulic table drive has been designed to provide two speed ranges: 10 to 100 fpm in the low cutting range and 100 to 200 fpm in the high cutting range. Maximum return speed is 200 fpm. This makes the machine suited for both carbide and high-speed steel tools. The Kopy-Kat duplicator head is a new design used with rail-mounted templates only. It is interchangeable with the standard railhead on the common railhead saddle. All hydraulic and electrical lines are equipped with quick-disconnect couplings, to facilitate change-over from duplicating to standard shaping. The duplicator is also equipped with a reset timer, automatic head lift, and ratchet lock.

Another feature of the exhibit will be the 72-inch Rockford hydraulic open-side shaper equipped with 3-

Fig. 2. Hy-Draulic 24-inch shaper with infinitely variable speed drive



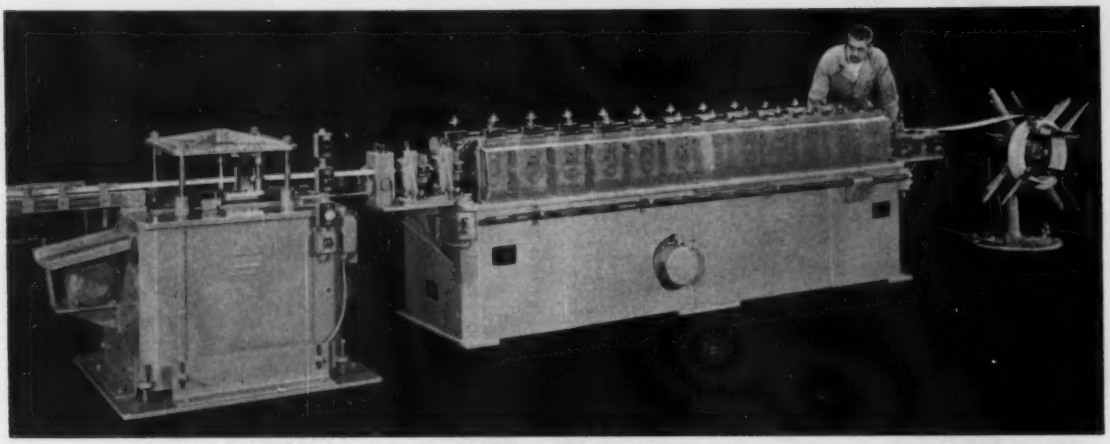


Fig. 3. Maplewood N-MR-12 roll-forming machine for heavy-duty production of a large variety of sections

hp milling head (Fig. 5). This shaper is convertible for shaping or milling. When equipped with a milling head, it can also be provided with either a full-form or rail template duplicator head for shaping. The shaper has a 15-hp hydraulic drive circuit, providing 200-fpm maximum cutting and return speeds. Table drive for milling is through a screw and double nut. Both the table and head feed screws for milling are connected to a common gear-box, providing infinitely variable feed rates of 1 to 100 ipr. Manual shifter levers are provided for milling feed control.

The all-geared driven milling head has a 3-inch quill adjustment. The spindle is machined with a No. 40 National milling machine taper and has a manual draw-bar. Eight spindle speeds are provided in the range of 50 to 1200 rpm. The milling head is completely interchangeable with the standard railhead on a common saddle and may be swiveled for angular cutting.

A 42- by 42-inch by 14-foot Hy-Draulic heavy-duty open-side shaper-planer with Kopy-Kat full-form duplicator will be displayed. This model has complete push-button control, a 50-hp hydraulic unit providing a maximum cutting pressure of 18,000 pounds, and a table with heavy cross and longitudinal ribbing to eliminate table distortion. It is equipped with Trava-Trol table stroke positioning, permitting pendant operation for setting table stroke length and positioning without the use of reversing dogs or linkage. It also has direct-current Tool-Trol, which provides three traverse speeds for the heads and makes it possible to position tools to within 0.001 inch from the pendant.

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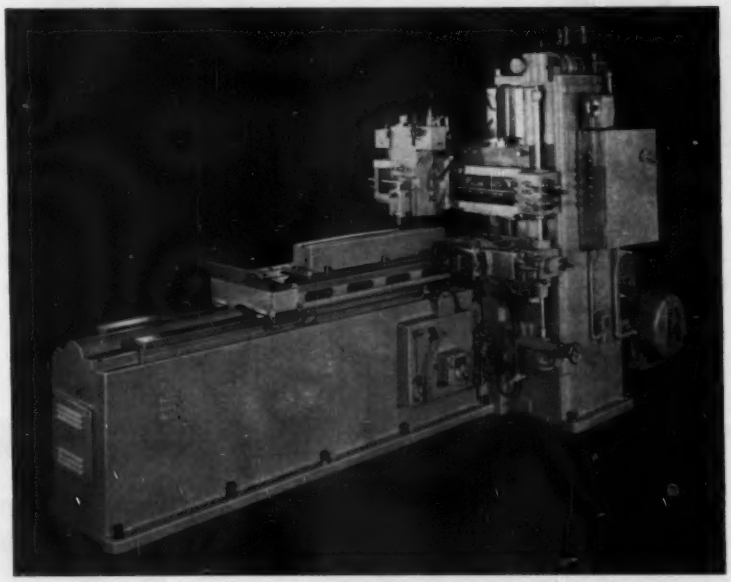
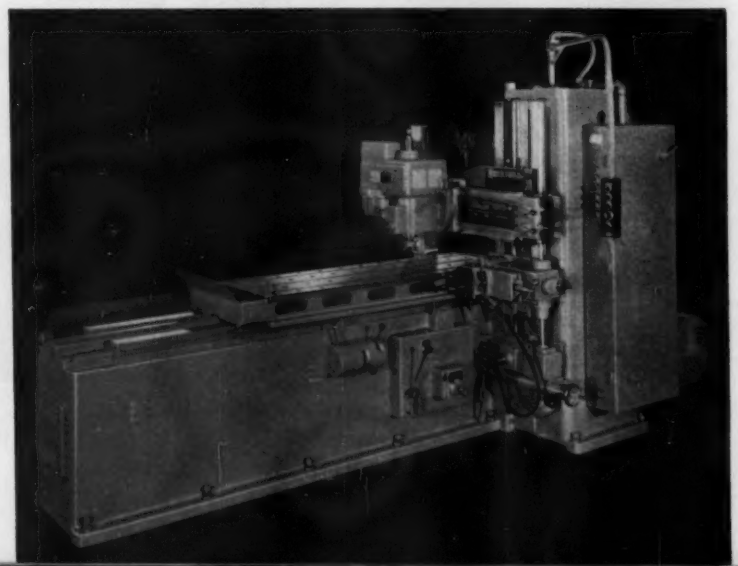


Fig. 4. Hy-Draulic 72-inch open-side shaper with rail template duplicator

Fig. 5. Rockford 72-inch hydraulic open-side shaper with milling head



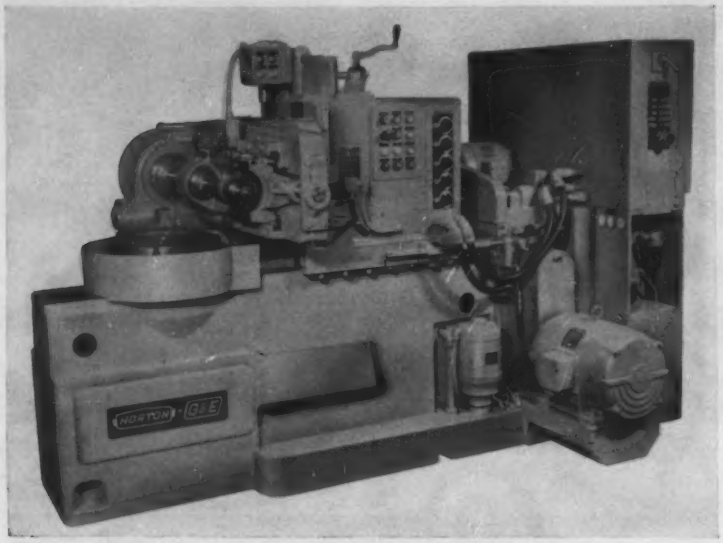


Fig. 1. Norton-Gould & Eberhardt No. 20 TWG, tangential worm-gear hobbing machine. Either hobs or carbide-tipped fly tools can be used

Hobbers, Grinders, and Shapers by Norton

Booth 651

The Norton Co., Worcester, Mass., will exhibit eleven new machine tools and pieces of equipment in addition to many others previously introduced. One of the new items is a Norton-Gould & Eberhardt No. 20 TWG, tangential worm-gear hobbing machine, Fig. 1. It is designed specifically for high production of single- and double-thread worm gears up to a 3-inch circular pitch. Both hobs and carbide-tipped fly tools can be used. The machines are available with automatic cycle, infeed, tangential feed, or combined infeed and tangential feed at preselected variable speeds.

A 6- by 12-inch Type TS hand-operated surface grinder, Fig. 2, has been engineered for low-cost performance of the many surface-grinding jobs falling within its range. Antifriction elements beneath the table and cross-slide members make operation easy. The machine is used with a 7-inch diameter, 3/4-inch wide grinding wheel. Maximum height, from table top to bottom of the standard wheel, is 12 1/2 inches. Longitudinal table travel is 14 inches; traverse travel, 7 inches. A handwheel provides a grinding-wheel feed of 0.050 ipr. In addition, the handwheel has a micrometer feed mechanism that permits down feed in increments of 0.0001 inch. A 10- by 16-inch Type TS hand-operated surface grinder will also be shown.

Tools can be ground economically on the No. 200 cutter and tool grinder shown in Fig. 3. A unique feature of this machine is its tilting wheel-head, Fig. 4, which simplifies difficult jobs. Graduations on the wheel-head indicate the amount of tilt. Clearance angles are read directly from these graduations, thereby eliminating the calculation of wheel-head settings. Jobs that require table movement can benefit from a guide rail beneath the center of the table that assures accurate

Fig. 2. Type TS, 6- by 12-inch hand-operated surface grinder engineered for low-cost operation

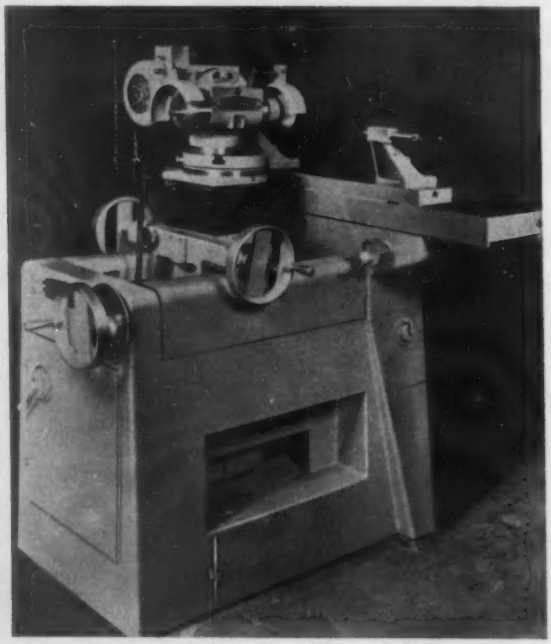


Fig. 3. Norton No. 200 cutter and tool grinder has a wheel-head that tilts 15 degrees above or below horizontal

Fig. 4. Setup for grinding a cutter between centers. Clearance angles can be read on tilting wheel-head (Fig. 3)

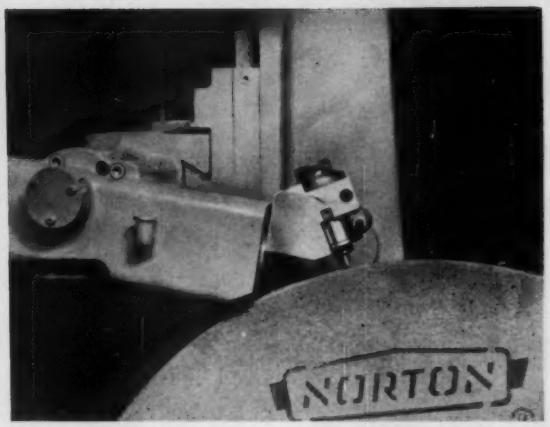


Fig. 5. Truing device does not have truing slide to feed the diamond. Wheel-feed mechanism performs this task

tracking. Diamond wheels can be run at optimum speeds because of the standard feature of two-speed wheel drive.

A Type CM-2 multiple-wheel machine incorporates many improvements for grinding crankshafts, camshafts, transmission shafts, and others requiring either multiple or exceptionally wide grinds. Grinding wheels of 42-inch diameter are standard. Newly designed truing devices, such as the one shown in Fig. 5, are located at the front of the machine, eliminating the truing slide that usually feeds the diamond into the wheel. The wheel-feed mechanism accomplishes this task, thus serving a dual purpose.

Two sizes of the Norton-Gould & Eberhardt dial-set universal shaper —a 16- and a 24-inch-stroke machine —will be displayed. The larger will be equipped with a hydraulic follower attachment for automatic contour shaping. Both sizes have sixteen ram speeds. Easy selection by a dial setting encourages the operator to select the optimum speed for each operation. An electric brake provides finger-tip control.

Circle 619 on Readers' Service Card

Kennametal Cutting Tools

Booth 1500
(Also Booth 111 at Navy Pier)

Kennametal Inc., Latrobe, Pa., will show its complete line of carbide cutters, tool-holders, and chip-breakers. A feature will be the Kendex Dial-A-Breaker tool, Fig. 1, for chip control of square and triangular throw-away inserts. Seventy-six holder styles and sizes are available.

Another highlight will be **Kendex** milling cutters with square carbide throw-away inserts, Fig. 2. Each insert has eight indexable cutting edges. There are left-hand and right-hand cutters in five diameters, from 4 to 12 inches. Other tools with indexable inserts—boring-bars, boring heads, multiple-block tools, and hollow mills—will be exhibited.

Titanium-carbide Grade K165 will be offered to withstand the heat of high-velocity machining. Edge-wear resistance of the material, it is claimed, is greater than that of conventional carbides, and many new high-temperature alloys can be machined with accuracy and to fine surface finish.

Circle 620 on Readers' Service Card

Fig. 1. Dial-A-Breaker with carbide chip-breaker plate

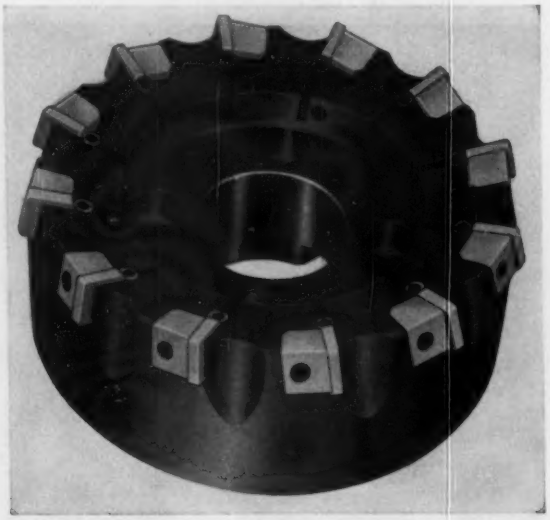


Fig. 2. Milling cutter with carbide throw-away inserts

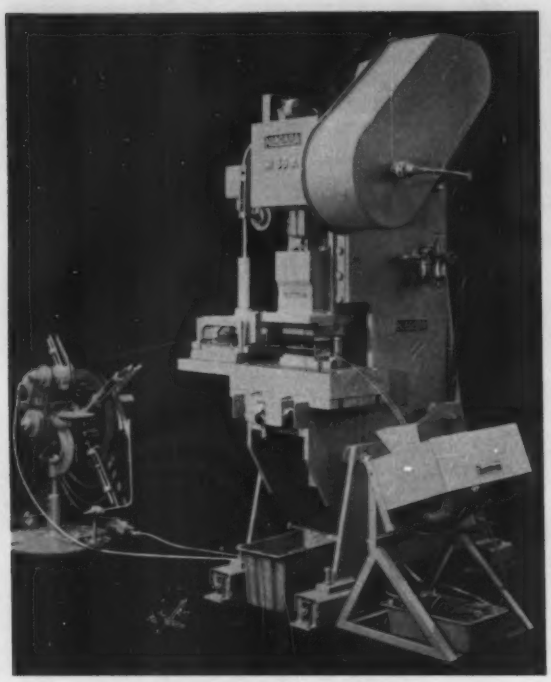


Fig. 1. Niagara ultrahigh-speed OBI press

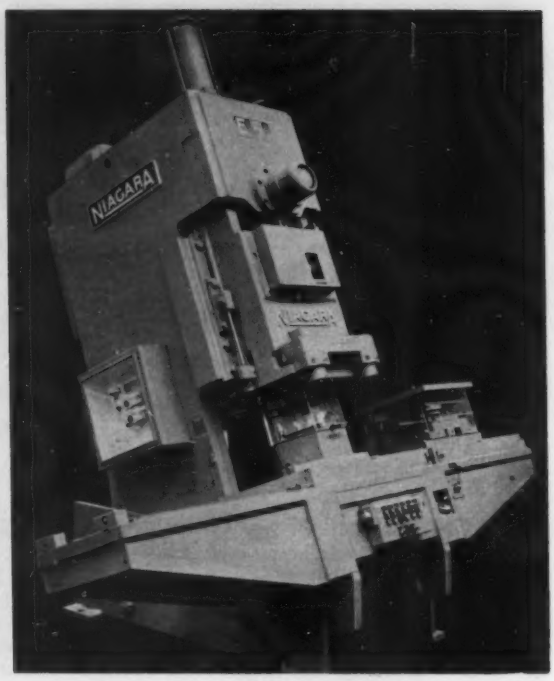


Fig. 2. OBI press featuring sliding bolster

Niagara Presses, Brakes, and Shears

Booth 1330

Niagara Machine & Tool Works, Buffalo, N. Y., will have twelve pieces of equipment on display, all embodying engineering advances. An ultrahigh-speed fully automatic OBI press, Fig. 1, will be shown in operation at variable speeds up to 1000 strokes per minute. The OBI press illustrated in Fig. 2 features a sliding bolster which permits a rapid change of die setups. The crankshaft of this press is arranged front-to-back. A third OBI press, rated at 45 tons and also with a front-to-back crankshaft, will be equipped with an automatic roll feed, stock reel, and scrap cutter and will be stamping out fuse tips. To measure frame strains, a portable instrument known as a Tonmeter will be demonstrated.

The 100-ton, double-crank straight-side press, Fig. 3, will be tooled with a progressive die, and will be set up and operating with a double roll feed, stock reel, and scrap cutter. It will be shown in use with the company's Load Moni-

Fig. 3. 100-ton, double-crank straight-side press

Fig. 4. 150-ton press with nine-station transfer mechanism

tor, an electronic device for continuously measuring press loads and automatically preventing overload repeats. Another double-crank straight-side press, Fig. 4, rated at 150 tons, will contain a nine-station transfer mechanism. A third straight-side press in the exhibit is a 250-tonner of two-point suspension and eccentric-gear design, and will contain a unique adjustable draw die and be equipped to operate in an automated line.

Three press brakes and two shears will also be shown: a 150-ton mechanical press brake (Fig. 5) with alternating two-speed control, a 60-ton mechanical press brake with inboard drive, a 400-ton hydraulic press brake, an overdrive power squaring shear with a 1/2-inch capacity, and an underdrive power squaring shear with a 10-gage capacity.

Circle 621 on Readers' Service Card

Fig. 5. Niagara press brake with die for bending long sheets

Snow Drilling, Tapping, and Threading Units

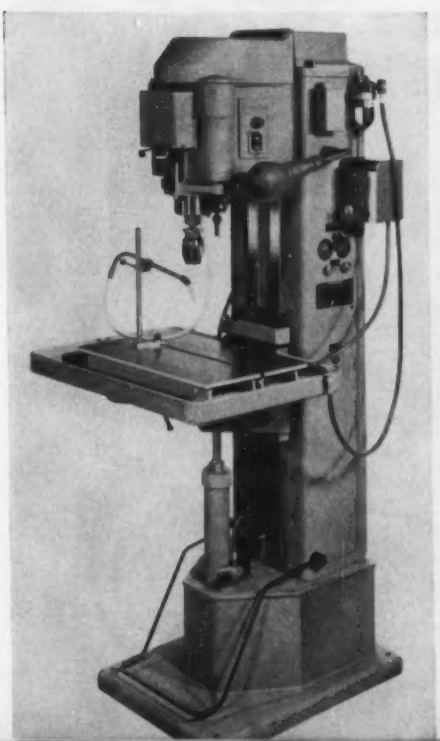
Booth 247

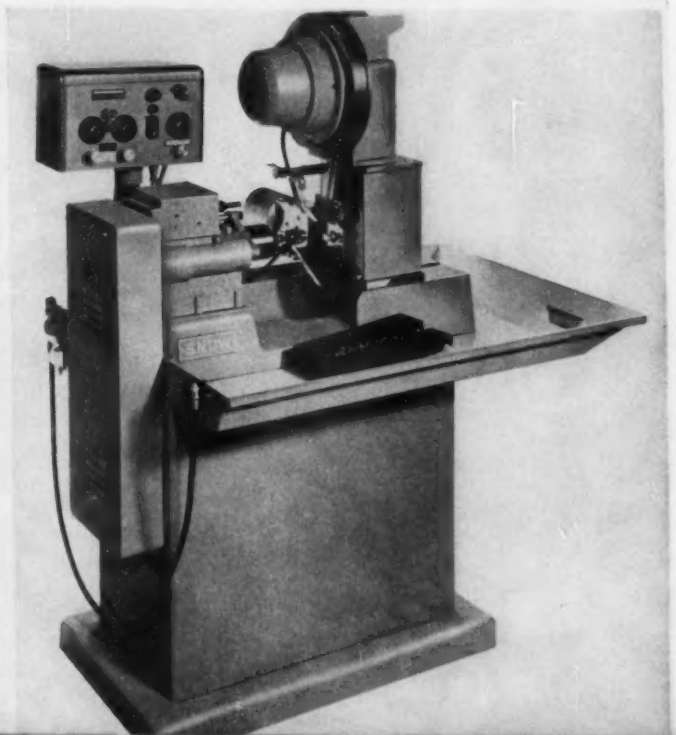
Infinite hydraulic feed control in conjunction with air feed are highlights of the universal drilling machine (Fig. 1) to be exhibited by Snow Mfg. Co., Bellwood, Ill. The hydraulic unit is adjustable for the amount of feed required and assures steady feed on interrupted cuts or break-through. This machine has a drilling capacity of 3/16 to 5/8 inch in alloy steel. The work-table is automatically positioned by air cylinder for quick change of tools and fixtures. Two ranges of spindle speeds with eight changes in each range cover from 300 to 1800 rpm. Solenoid units built into the machine synchronize clamping and indexing fixtures with the spindle cycle.

A horizontal drilling, tapping, and threading machine, Model 1-HD (Fig. 2) will be shown with hopper feed for long run operations and hand feed for short runs. As many as 6000 cycles per hour can be obtained. Drill capacity is from No. 60 to 3/8 inch, and tapping capacity from No. 0 to 1/2 inch.

A new direct-drive vertical tapping machine, Model 2-RM (not shown), with a capacity from 1/4 to 5/8 inch, has spindle speed ranges from 300 to 1000 rpm. The work-table is positioned by air for quick change of tools and fixtures. Sole-

Fig. 1. (Left) The work-table is moved quickly by air cylinder on Snow's new vertical universal drilling machine. Fig. 2. (Right) A hopper feeds work to this Model 1-HD horizontal drilling, tapping, and threading machine as fast as 6000 parts per hour





noid units built into the machine synchronize air-operated clamping and indexing fixtures with the spindle cycle. This machine is ideally suited to tapping alloy and heat-treated materials.

Circle 622 on Readers' Service Card

Ekstrom, Carlson Tape-Controlled Milling and Profiling Machines

Booth 846

Ekstrom, Carlson & Co., Rockford, Ill., will introduce the No. 200 series "Eccomill" continuous-path, tape-controlled milling and profiling machines. Built in a wide range of sizes, this series is of the traveling table, vertical spindle, bridge type design and has multiple-axis control. The machine shown in the illustration, which has a work-table surface of 60 by 144 inches, will be demonstrated at the Exposition.

Some of the features of the series are: antibacklash, recirculating ball bearing screws on each axis; unit type, recirculating roller bearings on the table, saddle, and vertical slide; "Dial Speed" water-cooled direct-current milling head, providing continuously variable spindle speeds from 15 to 6000 rpm; and way surfaces protected by wipers and full covers. Optical viewers and precision scales are provided on all axes of movement and a swivel type, pendant control station is employed. Either a magnetic or a punched tape control system can be supplied. The machine illustrated is equipped with a General Electric Mark III numerical contouring control system.

Circle 623 on Readers' Service Card

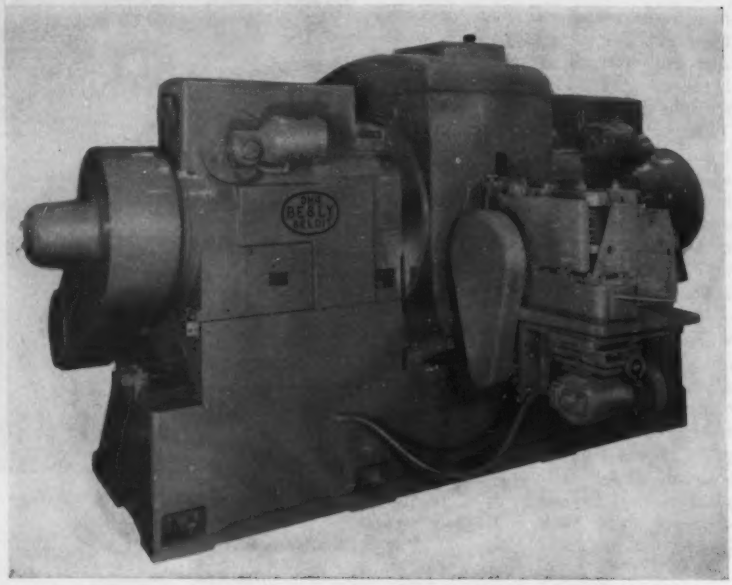


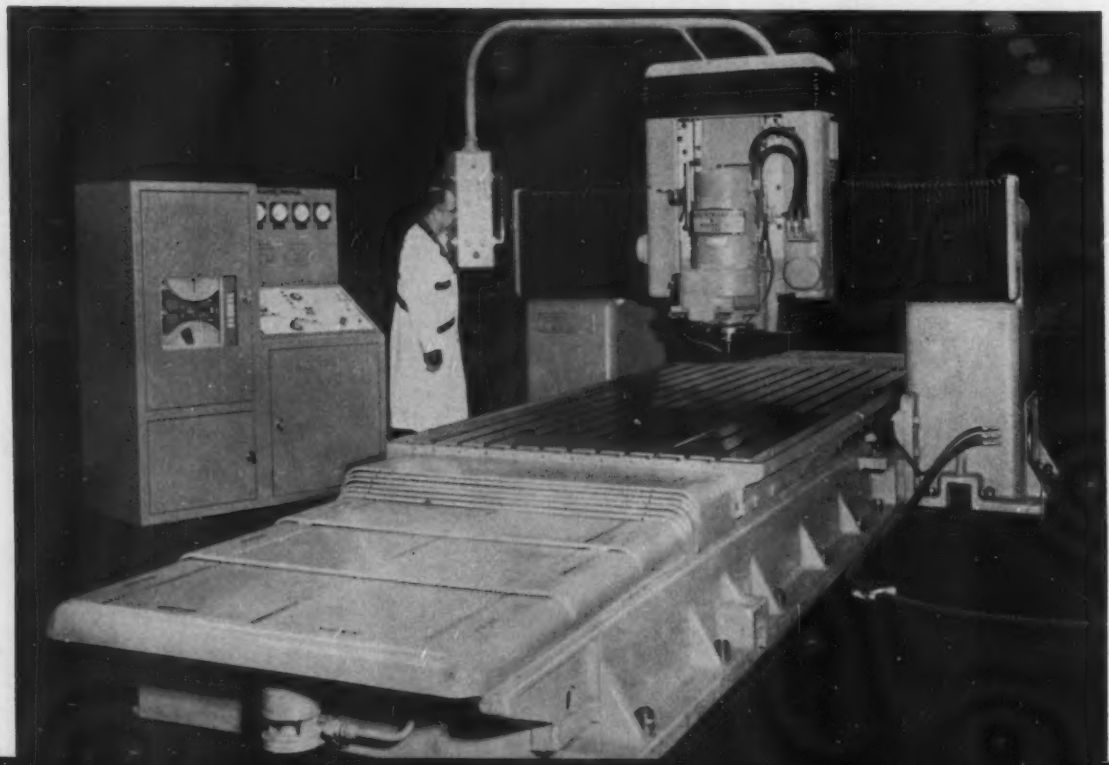
Fig. 1. Besly double-spindle automatic disc grinder

Besly-Welles Disc Grinding Machines

Booth 945

Newest developments in high-production disc grinding equipment will be demonstrated by the Besly-Welles Corporation, South Beloit, Ill. Machines on display can handle

Ekstrom, Carlson milling and profiling machine equipped with three-dimension, continuous path tape control



coil springs, carbide inserts, ceramic parts, and precision components for mass production industries, such as the appliance, automotive, and farm equipment industries. The exhibit's highlight will be the DH 4 double-spindle disc grinder seen in Fig. 1, which practically runs automatically. Features include push-button operation, 0.0001-inch accuracy, simple three-stop abrasive change, automatic dressing and sizing, centralized one-shot lubrication, and an improved coolant system. The DH 4 can be tooled to grind parts, such as bearing-race faces, piston rings, seal rings, valve-seat inserts, and pump and compressor components.

The DH 2, Fig. 2, is a double-spindle machine particularly suited for through-feed operations and operations requiring clamping of parts, such as wrist pins and valve stems, to assure squareness of the ground surfaces with a mating surface.

The TV 3, Fig. 3, is designed for grinding the parallel ends of coil springs. Additional heads can be added for multiple-grinding operations. Abrasive discs and tooling can be easily and quickly changed. A feature of this machine is its feed-well which oscillates as it revolves. This orbital grinding action is claimed to be more efficient, provide a longer disc life, and require fewer dressings.

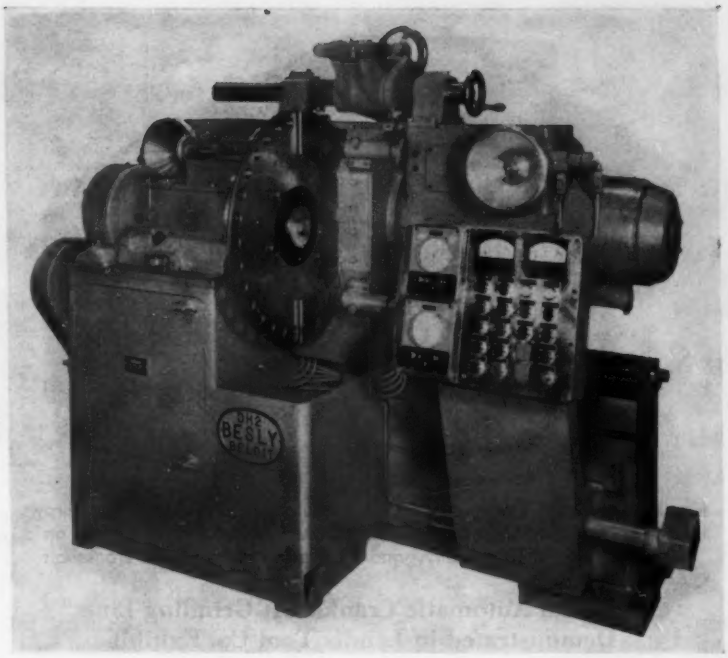


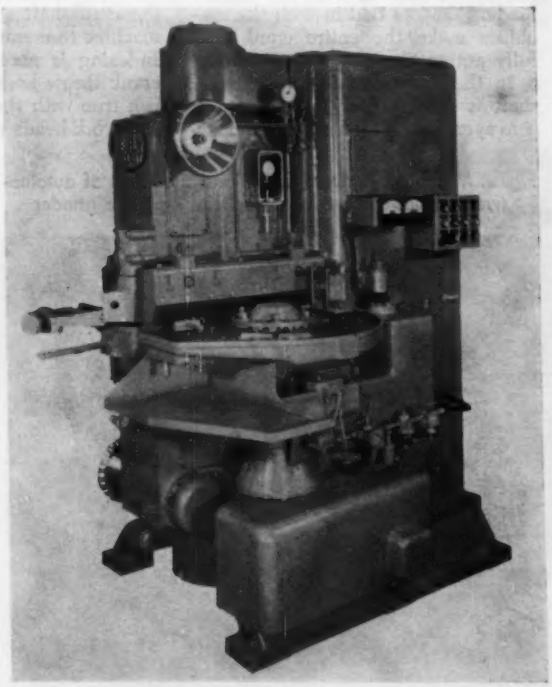
Fig. 2. Disc grinder designed for through-feed operations

The DV 2, Fig. 4, is a vertical model offering automatic sizing, and lends itself to automatic loading and unloading. It is easy to set up and requires very little floor space. Work enters and leaves the machine at the same convenient height. Independent spindle motors with belt drives permit use of large spindle bearings.

Circle 624 on Readers' Service Card

Fig. 3. Besly equipment for grinding coil spring ends parallel

Fig. 4. Vertical adaptation of disc-grinding principle



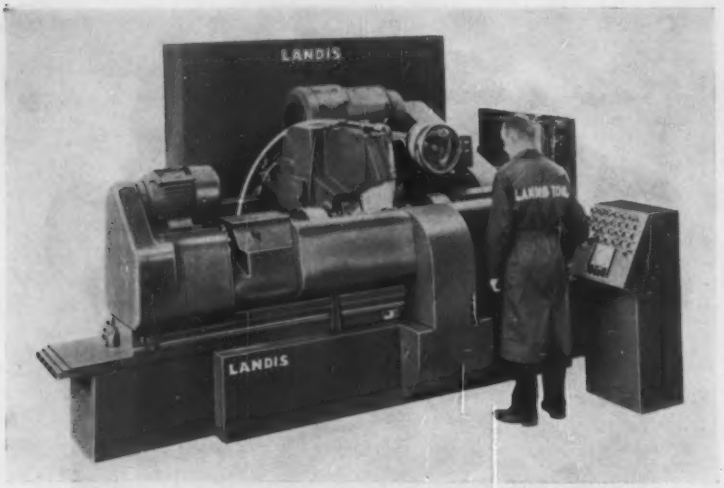


Fig. 1. Automotive crankpin grinder that automatically indexes pin throws is one of two special-purpose machines which, arranged in tandem on a crankshaft line, automatically grind all bearing surfaces of a crankshaft

Practical Automatic Crankshaft Grinding Line Demonstrated in Landis Tool Co. Exhibit

Booth 823

Complete grinding operations on all crankshaft line and throw bearings are accomplished by means of tandem machines developed by the Landis Tool Co., Waynesboro, Pa.—a 10-inch IWR multiple-wheel grinder (similar to machine described in June, 1959, MACHINERY, page 168) and a novel, newly engineered automatic crankpin grinder, Fig. 1. Automatic conveying, loading, and unloading devices tied in with the machines make the entire crank line fully automatic from start to finish.

In the first operation, the crankshaft is automatically lifted from a conveyor and placed in position on the IWR machine. All seven line bearings are ground simultaneously by six wheels to finish size, as indicated by a sizing gage.

The crankshaft, after automatic conveying from the IWR machine, is placed by loading fingers on the automatic crankpin grinder, Fig. 1. This machine employs a new and revolutionary concept in grinding crankpins by automatically indexing the crankshaft without stopping the machine to manually index the shaft. Indexing is necessary to make the crank throw bearing (being ground) run true with the axis of rotation of the work-heads of the machine. Indexing is done automatically, on the fly, without stopping work rotation.

After automatic loading of the crankshaft, the table is automatically indexed to align the proper crankpin with the grinding wheel. Final automatic alignment of the shaft with the wheel (to within thousandths of an inch) is made with a new automatic locator.

At this point, the grinding wheel advances to grind the side walls and bearing diameter. The new wedge type combination work-rest and sizing gage are applied automatically. Microfeed is used to bring the shaft to exact size. The wheel resets and the work-table moves the shaft to the next crankpin. At the same time, the shaft is automatically indexed by the crankshaft, while rotating, to the next crankpin.

Production grinding of multiple diameters of a front axle spindle, in combination with faces and radii, is automatically performed on the Model R plunge cylindrical grinder, Fig. 2. A single-purpose machine, the grinder is designed for production work to close tolerances in automatic or semi-automatic cycles and with angular or straight wheel-head placement. Tooling can be designed to handle a broad range of parts normally production ground on center type machines in the 15-hp class.

Simplified positioning of headstock and grinding wheel on the new Landis Type R chucking grinder, Fig. 3, reduces setup time to a minimum for work-pieces that are most efficiently ground in a chuck. The diameter and face of side gears will be cut down automatically. Faces, outside diameters, radii, and tapers can be ground singly or in combination on the machine. Wheels can be

Fig. 2. Multiple diameters, faces, and shoulders of automotive spindles are ground by special R plunge grinder

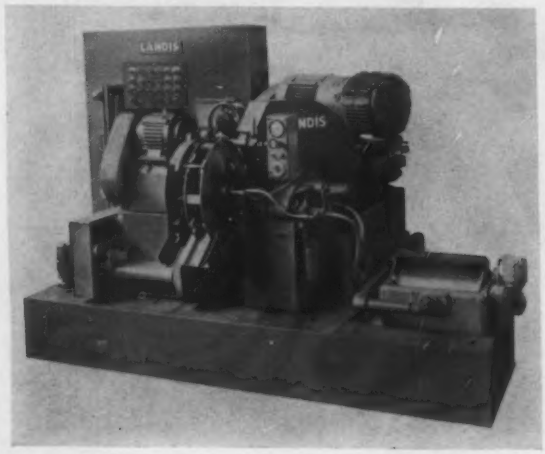
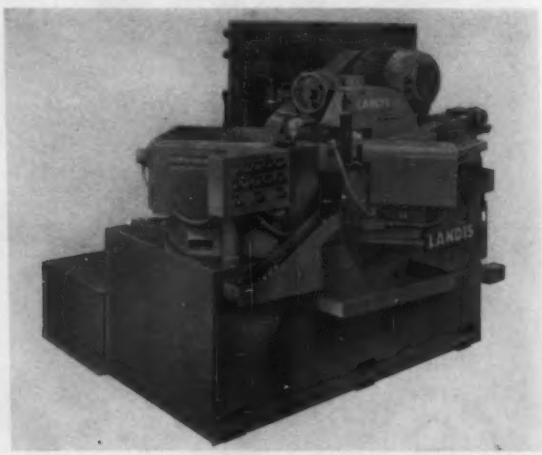


Fig. 3. Landis R chucking grinder cuts setup time by means of a new headstock positioning arrangement



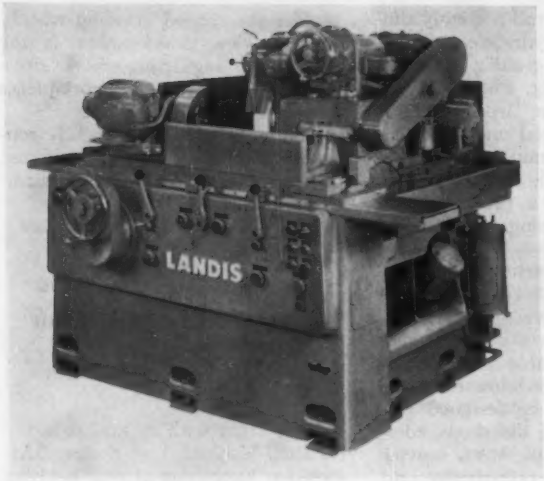


Fig. 4. Microfeed on 10-inch universal machine grinds to 10 millionths inch roundness

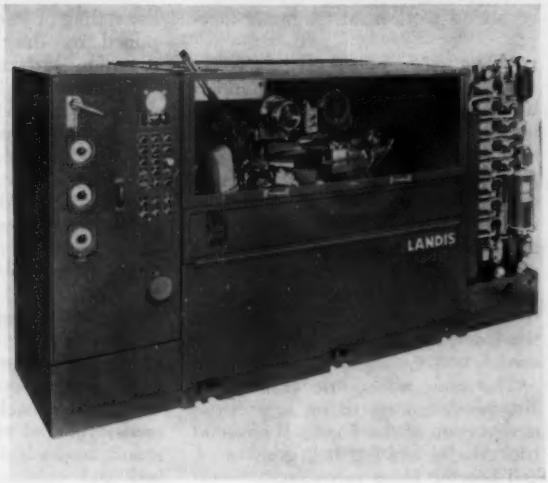


Fig. 5. New Landis cone grinder has novel chuck for automatically grinding tapered bearing cones

spaced, if necessary, and dressing can be arranged to produce the desired profile.

Superprecision grinding of parts to 10 millionths inch roundness will be demonstrated on a Landis 10-inch Type R universal cylindrical grinder equipped with Microfeed, Fig. 4. This machine was designed especially for precision work required in missiles, aircraft, fuel injectors, and similar close-tolerance parts, grinding to millionths-of-an-inch tolerances for size and straightness. A semi-automatic cycle will plunge-grind to remove 0.003 inch of stock to finish size.

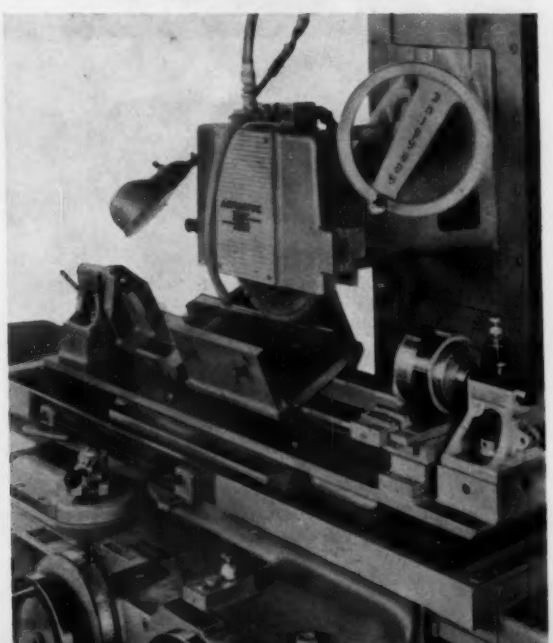
Landis Microfeed is a new method of grinding, with ultrafine wheel-feed increments controlled by a single contact gage. It has a constant reset regardless of the amount of feed required to reach finished size. The constant reset feature establishes the zone of operation for the next cycle, regardless of the amount of feed used on the previous cycle, and automatically cancels all grinding variables which affect finish size.

Automatic grinding of tapered roller bearing inner races will be performed on a special purpose cone grinder, Fig. 5. Operations of this machine is based on the company's concentric grinding principle. The grinder is designed to fit into a production line where the machines are placed side by side.

The principle of the concentric work-holding device is a headstock spindle faceplate containing permanent magnets. This magnetic plate is face-ground in place on the machine so that it is flat and its surface is at right angles to the wheel-spindle. The work-piece is placed on an arbor smaller than the bore. Set in the arbor are two wear-resistant strips on which the bore of the work-piece rides. In operation, this work-holder is moved off-center in relation to the

Fig. 6. Model 618 surface grinder now has hydraulic table reverse and saddle cross-feed

Fig. 7. Landis Hydrabrasive 1224 grinder, fixtured for radial-grooving cuts in twister guides



revolving work-head magnetic faceplate.

When the nonrevolving workholder moves from loading position to the grinding position at the magnetic faceplate, the magnets seize the work and hold it against the precision-ground faceplate, which causes the work to rotate. A centering action occurs, but lateral movement is restricted by the wear-resistant strips of the work-arbor. This centering action produces the forces that keep the work-piece riding on the insert strips. There are no rolls used.

The same concentric chuck will also be demonstrated on a modernized version of the Landis R concentric grinder making ball grooves in ball bearing inner raceways.

Fast, accurate grinding of flat surfaces at a uniform rate of feed are features of the hydraulically operated Model 618 precision surface grinder, Fig. 6, to be shown for the first time at the 1960 Machine Tool Exposition.

Formerly available as a hand-operated machine, the 618 will be offered with hydraulic table traverse and hydraulic cross-feed of the saddle. Each function has its own hydraulic motor and control.

The tricky job of grinding special forms for the twister guides used in the rolling of steel rod is greatly simplified by the Hydrabrasive 1224 precision surface grinder equipped with special tooling, Fig. 7. In this demonstration, the work-piece is clamped in a special cradle attachment. A follower imparts a rocking motion to the cradle and work-piece so that it grinds a predetermined radius, thus forming the twister guide groove.

Design improvements in the Landis Abrasive No. 1 1/2 hand-operated precision surface grinder, Fig. 8, have resulted in a more rugged, stable machine capable of a high degree of accuracy on close-tolerance work. This machine, designed primarily for tool and die shops, toolrooms, and job shops, has a heavier bed and column, precision-ground and scraped for accurate alignment of wheel-head, table, and saddle.

Advantages of using automatic increment down feed for grinding a variety of parts will be shown by a Landis Hydrabrasive 1224 precision surface grinder, Fig. 9, equipped with hydraulic table traverse, hydraulic cross-feed, and power elevation of the wheel-head.

The improved Landis 12R centerless grinder (not shown) will demonstrate automatic grinding of grooves and carbon relief contours on auto engine valves. A rotary diamond tool profiles the spaced grinding wheels. Another new development is the Lockspeed regulating-wheel drive for producing rounder work-pieces in faster grinding cycles.

Another version of the 12R centerless grinder will be demonstrated grinding steel bars 6 inches in diameter and 8 feet long.

Circle 625 on Readers' Service Card

Golden Anniversary is Theme of Lees-Bradner Exhibit

Booth 481

Concurrent with its exhibit at the National Machine Tool Builders' Association Exposition of gear hobbing machines, Lees-Bradner Co., Cleveland, Ohio, celebrates its golden anniversary. This observance will be the occasion for the unveiling of two heavy-duty, single-spindle vertical production machines that incorporate new mechanical and electrical devices contributing to speed, productivity, and operator safety. The basic differences between the new 12 HD unit and the company's Model 7 HD are size and the power to hob 12-inch gears.

The hob head has been improved by redesign, and the resulting head

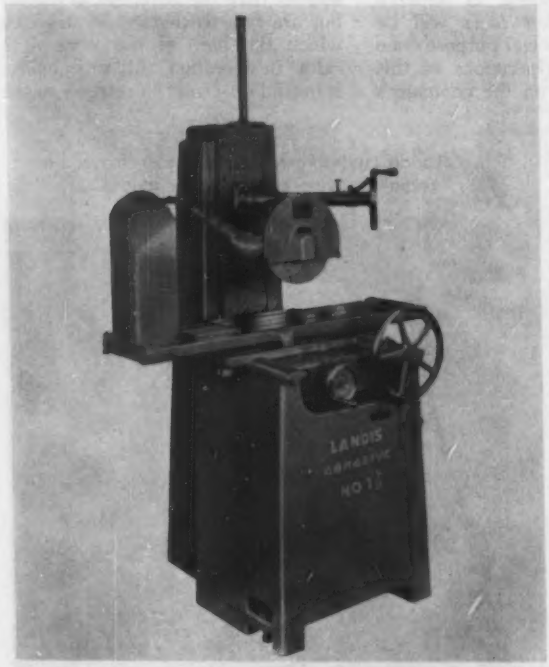


Fig. 8. Manually operated Model 1 1/2 achieves increased stability and accuracy for tool and die sharpening through the use of a heavier bed and column

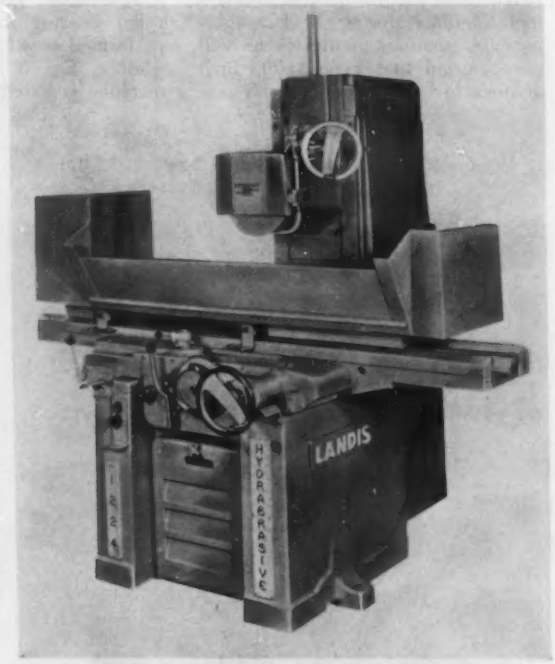
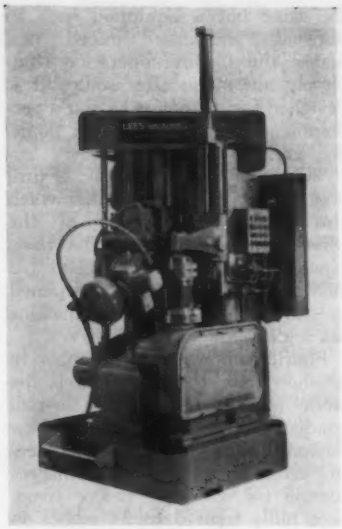


Fig. 9. Automatic increment feed of the wheel-head, hydraulic table reverse, and hydraulic cross-feed are new features of Hydrabrasive 1224 machine



Model 12 HD heavy-duty, vertical spindle production hobbing machine, shown with guards off

will be standard on the 7-inch as well as the new 12-inch machine. Now available are two accessories for the 12 HD unit. One of them is a lead-differential mechanism called the Dial-it 3 1/2-inch electric hob shifter. The other accessory is an alternating-current, variable-speed main drive.

Included in the display will be the well-known 7HD 8- by 20-inch single-spindle vertical hobber equipped with the new hob head and incorporating a removable work-holding fixture.

Circle 626 on Readers' Service Card

Minster Line of Presses

Booth 1339

Among the many presses to be presented by the Minster Machine Co., Minster, Ohio, is the automatic P2-45 Piece-Maker, Fig. 1, which was designed for use in high-speed progressive-die operations. It is a two-point, straight-side machine featuring exceptional slide guiding and slide-to-bed parallelism. Shock-mounted press control, air manifold, and lubrication distribution blocks are located in cabinet enclosures in the crown. Minster ViscoMatic continuous recirculating-oil lubrication system is standard. The flywheel brake is electrically interlocked with the drive-stop circuit. Piece-Maker presses are available in nine capacities from 20 to 300 tons, with four widths in each capacity.

The B1 flywheel, high-speed gap press, Fig. 2—ranging from 16 to 60 tons—features a new fixed-base design for stability in high-speed automatic operations. Variable speeds range from 400 to 800 strokes per minute. The frame top is boxed for maximum crankshaft rigidity, and the company's combination air-operated friction clutch and brake is standard equipment. Other features are a high-speed balanced crankshaft, snap-in bearings, and a ViscoMatic recirculating-oil lubrication system.

On the S2-200 straight-side, two-point press shown in Fig. 3, the combination air-operated friction clutch and brake unit is mounted on the intermediate shaft for high single-cycle efficiency. No pits are required—the press has but one air connection and one electric-power entrance. Electrical, air, and lubrication systems are located within the uprights. A point-of-stroke indicator and two die cushions with guided pressure-pads are mounted in the

Fig. 1. Minster Piece-Maker built for progressive-die operations at high speeds

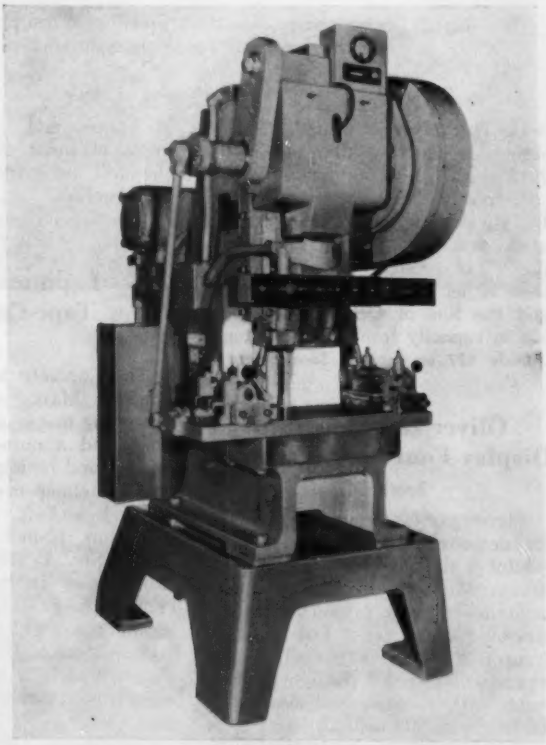


Fig. 2. B1 flywheel, high-speed gap press provides 400 to 800 strokes per minute

Fig. 3. Double-geared, twin-drive press has clutch and brake on intermediate shaft for single-cycle efficiency

bed. This press is available either single- or double-geared, and in capacities of 150 to 500 tons.

Two other lines will be exhibited by Minster. These are the G1-110 single-point, single-geared gap type presses in capacities of 75 to 250 tons, either fixed base or inclinable; and the line of OBI presses ranging in capacity from 12 to 75 tons.

Circle 627 on Readers' Service Card

Oliver Instrument to Display Four New Machines

Booth 342

Eleven machines will be operating for demonstration purposes at the exhibit of the Oliver Instrument Co., Adrian, Mich. Four of the machines have never been exhibited at any previous show. The first of this group is a Model "600" drill pointer which will produce the Oliver drill point with increased clearance at the center of the drill. It has a 1/2- to 3-inch capacity, and can grind two-, three- and four-flute drills. Provisions are made for variable clearance and variable included angle of point. All cutting lips of the drill are ground in one continuous motion.

The second machine is basically the same but is equipped with an unusual "airdraulic" infeed that makes the feeding operation completely automatic after setup. It is designed for customers having a predominance of large-size drill pointing work.

Third is a heavy-duty No. 21 drill pointer. This is a bench model which also features production of the Oliver type drill point. The basic capacity of this unit is 3/32 to 1/2 inch. Smaller drills can be sharpened by using a pin vise. This machine has a diamond wheel dresser.

Fourth among the machines to be shown for the first time is the Model "624" automatic face-mill grinder. This is a completely new version of the Oliver automatic face-mill grinder which has been in production for over twenty-five years. Face mills from 6 to 24 inches in diameter can be handled on this machine. In addition, new tooth forms can now be ground, including the periphery of the cutter. Dressing, grinding, indexing, and upfeed are automatic. Roughing and finishing cuts are also taken automatically, thus permitting the operator to perform other jobs while the cutter is being ground.

Other machines to be shown include the heavy-duty "Ace" tool and cutter grinder, template tool bit grinder, heavy-duty die-making machine, and S-4 bench model die-making machine. This latter unit is also designed for the sawing and filing of unusual contours on thinner work. It has two speeds, and the table tilts in two directions to permit the sawing or filing of compound angles.

Circle 628 on Readers' Service Card

Lapointe Broaching Machines, Sharpener, and Tape-Controlled Drilling and Boring Machine

Booth 1229

The Lapointe Machine Tool Co., Hudson, Mass., will display three broaching machines, a broach sharpener, and a numerically controlled drilling and boring machine. Two of the broaching machines appear in Figs. 1 and 2, respectively. The 1 1/2-ton, 12-inch stroke SPD machine, Fig. 1, is powered through a ball screw and operates at speeds of 5 to 10 fpm. Equipment includes an automatic puller, work nest, and coolant system. The machine will be shown broaching internal configurations from a 3/4-inch round starting hole.

The 15-ton HP-30, Fig. 2, is a pull type broaching machine designed for squaring the ends of bar stock of any length. It is equipped with a hydraulic vise which can accommodate bars up to 5 3/4 inches square. A dial indicator determines length of the bar when squaring the second end.

The third broaching machine is a 5-ton, 54-inch stroke UVHS (universal vertical hydraulic single-ram) model and will be demonstrating the fully automatic processing of a rifle extractor. Made from steel bar stock, the work will be fed, clamped, broached, and cut off to length.

Fig. 3 shows the 72-inch sharpener for both internal and surface broaches. Features include a Micro-Feed attachment for minimum stock removal, three-speed frequen-

cy changer for spindle speeds to 10,800 rpm, special air spindle for backing off surface broaches, mist coolant system, swivel chuck, and motorized headstock and tailstock with index attachment.

The numerically controlled drilling and boring machine is of double-column design, with a 48-inch rotary table. Indexing accuracy of the table is within 6 seconds of arc. The cross-rail, on which the spindle is mounted, is raised and lowered by power. The machine can be operated in several ways: by a two-axis punched tape controlling the angular position of the table and the lateral position of the spindle on the cross-rail; "manual numerically," by dialing in information; fully automatically, using electromechanical means; or semi-automatically, by push-buttons.

The exhibit will also include a display stand of Lapointe surface, internal, and spiral broaches.

Circle 629 on Readers' Service Card

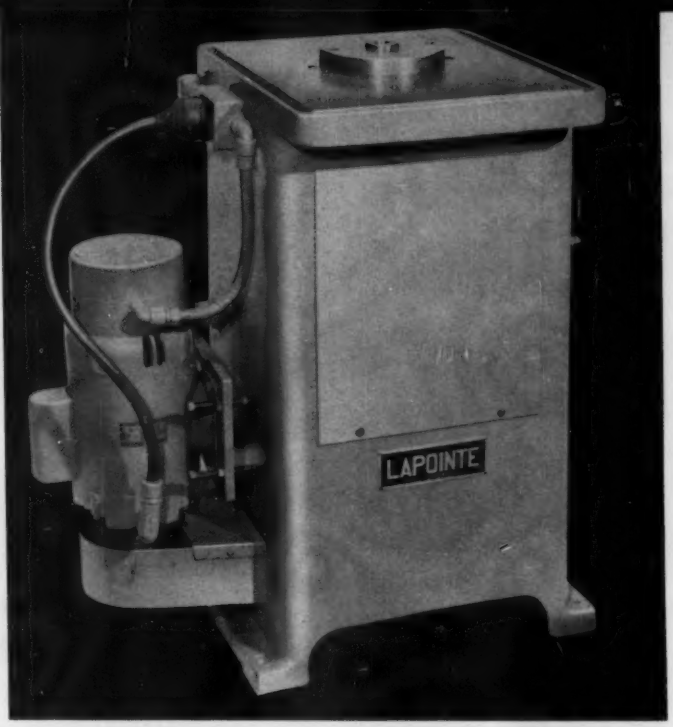


Fig. 1. Screw-driven small internal broaching machine

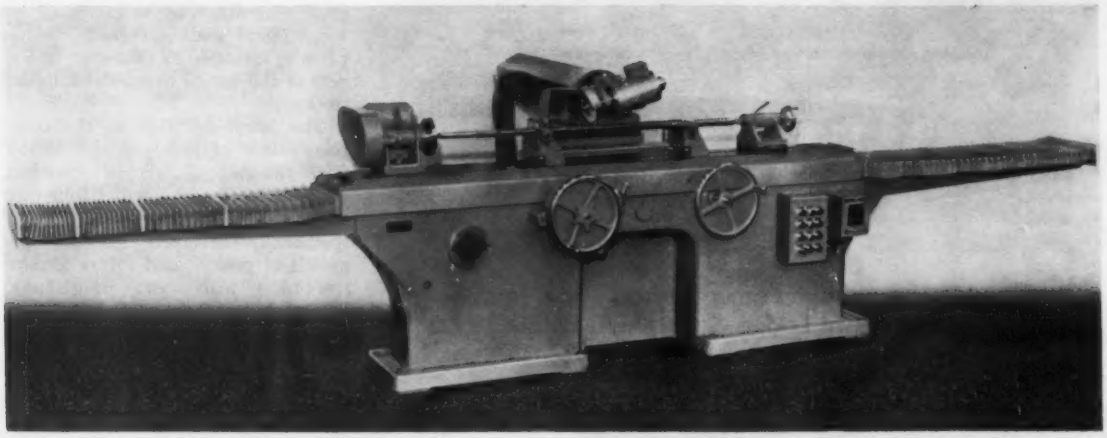
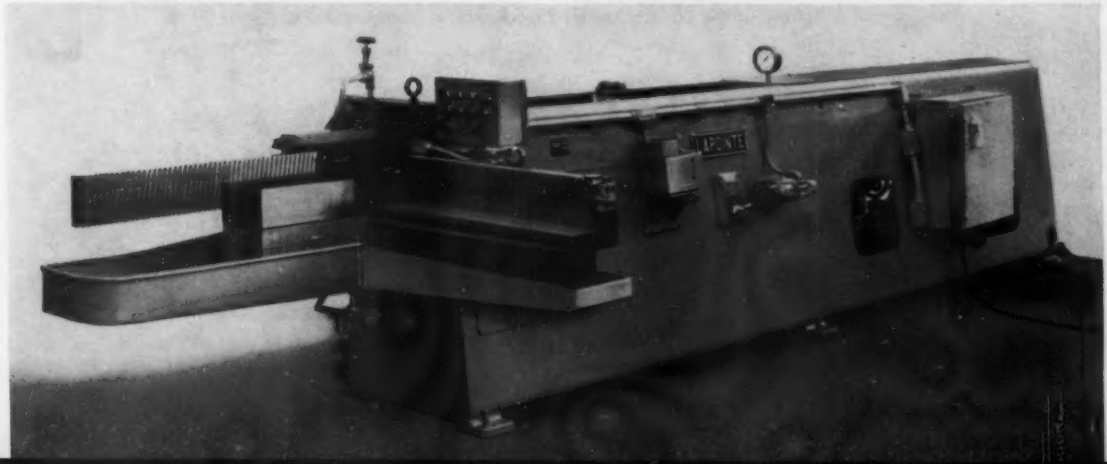


Fig. 2. Broaching machine for squaring ends of bar stock built by Lapointe Machine Tool Co.

Fig. 3. Lapointe 72-inch internal and surface broach sharpener with Micro-Feed attachment



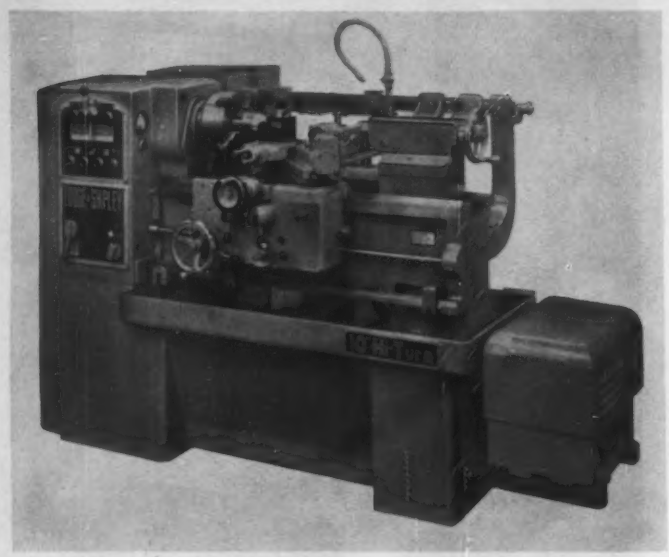


Fig. 1. (Left) A constant cutting-speed attachment on Model 1307 Hi-Turn lathe will turn tapered glass-mold parts under tracer control

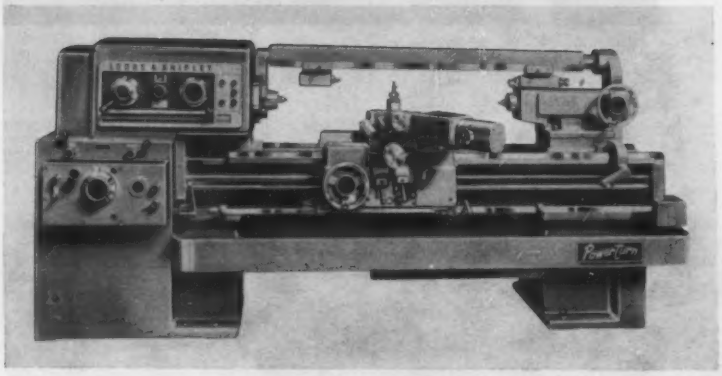


Fig. 2. (Below center) Steep-contoured turbine shafts will be tracer-turned on Model 2013 Powerturn Copymatic to demonstrate combined-feed feature

Shear-Spinning and Tracer Lathes, Press Brakes Operating in Lodge & Shipley Exhibit

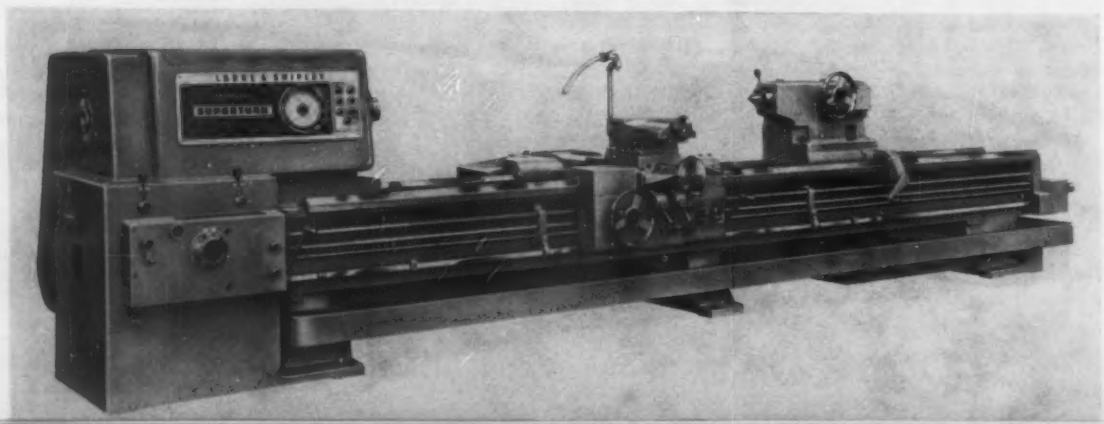
Booth 1046

The theme of the Lodge & Shipley Co. (Cincinnati, Ohio) display will be the "Practical Approach to Productivity." Twelve machines, ranging from a small squaring shear to a big Floturn machine, will be operating, demonstrating improvements in design and operating techniques which result in practical productivity.

The company's 10-inch Hi-Turn lathe, Model 1307, with 45-degree Copymatic hydraulic tracer and new constant cutting-speed attachment (Fig. 1), will demonstrate rough- and finish-turning of a conical bottle-mold plunger (tooling used in glass bottle manufacture) with ceramic tooling. The universal, constant cutting-speed equipment, with exclusive rack and pinion arrangement, produces a fine surface finish needed for this work-piece. A four-way power rapid traverse and new compact carriage-mounted hydraulic tank will be featured on the Model 2013 16-inch Powerturn 45-degree Copymatic lathe. This lathe, Fig. 2, will be demonstrated turning a turbine shaft with a steep contour. Tracer slide movement is arranged for combined feed (simultaneous engagement of longitudinal and cross-feed), which permits changes in diameter in excess of the actual hydraulic cylinder stroke.

The latest addition to the company's line of lathes is the Model 2516 20-inch Superturn Preselect machine, Fig. 3, with four-way power rapid traverse. This lathe is specifically designed for the demands of present and future tooling (ceramics) with extra ruggedness, higher horsepower, and other features. The demonstration operation will show rough-turning of a large, stepped roller shaft with heavy cuts through the effective use of ceramic tools. The lathe will work in conjunction with a 16-inch Model 2013 16-inch Powerturn 45-degree Copymatic lathe with the company's new automatic machining cycle, and four-

Fig. 3. Ceramic tools cutting a stepped roller shaft will demonstrate the extra power and rigidity of the 20-inch Model 2516 Preselect Superturn lathe



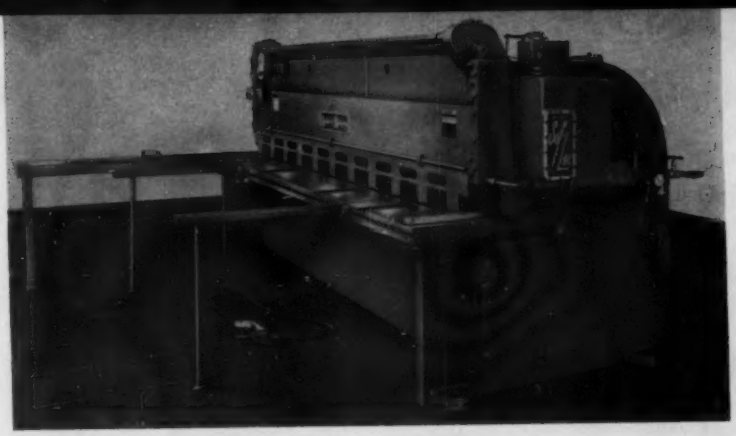


Fig. 4. (Right) New Sof-Loc air-hydraulic hold-down system, featured on Model 0410 power squaring shear, improves accuracy

Fig. 5. (Below center) Run-of-the-shop, light-duty job and production work will be demonstrated on the Model 0210 power squaring shear

way rapid traverse. Here the demonstration operation will be finish-turning the same stepped roller shaft rough-turned by the first lathe.

Another practical approach to productivity will be made by Model 0410 power squaring shear, Fig. 4, with "Sof-Loc" air-hydraulic hold-down system and a newly strengthened, self-aligning back-gage. This 1/4-inch by 10-foot shear is equipped with ram adjustment for slitting and notching operations. The absence of vibration, noise, shock, and damage to material that results from the new low-impact hold-downs will be highlighted, as will the extreme accuracy in production shearing due to the Sof-Loc system, which will be proved by tests for squareness and parallelism. A general demonstration of sheet-cutting accuracy will be displayed by the Model 0210 power squaring shear, Fig. 5, with 1/8-inch by 10-foot capacity, for general light-duty shearing under job and production conditions. This shear has the new front-operated back-gage.

A still smaller but equally versatile Speed Shear will be under power

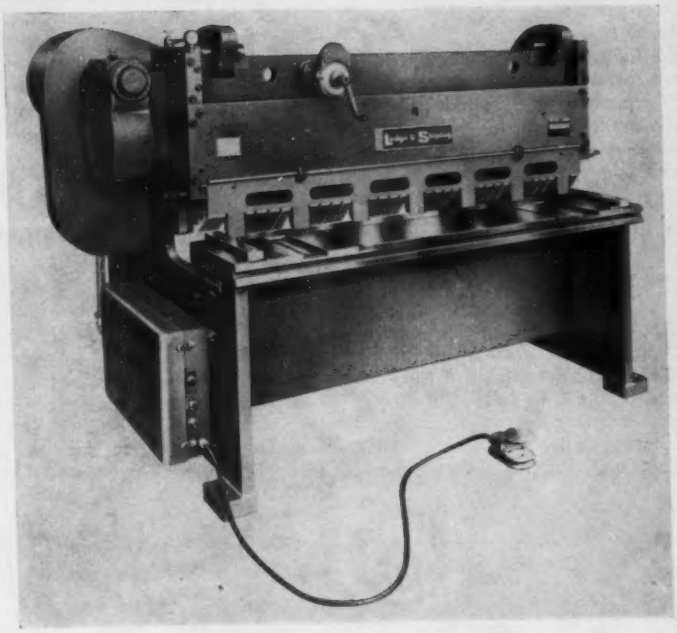


Fig. 6. Versatile 24-inch Lodge & Shipley Speed Shear can be tooled to double as a notcher as well as cutting sheet

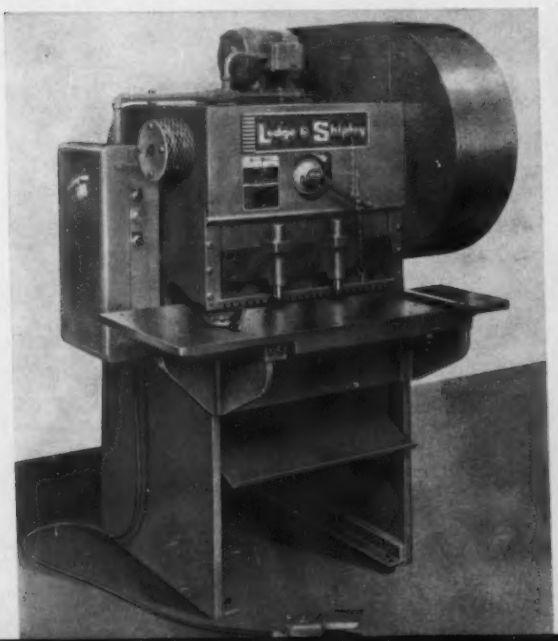


Fig. 7. Tonnage indicator and two-speed drive are outstanding new additions to this 150-ton power brake

doing small shearing jobs fast and economically. This 1/8- by 24-inch model (Fig. 6), is arranged for convenient setup of guides to do repetitive operations such as notching, trimming, and blanking. Equipped with a front-operated back-gage and a projected light-beam gage (for making cuts to a scribed line), the shear will demonstrate a notching operation that offers extreme accuracy in repetitive cuts.

Practical approaches to bending for productivity will be shown on a Lodge & Shipley 150-ton, 10-foot power press brake, Fig. 7, equipped with a two-speed drive and a tonnage indicator. This machine will be demonstrated with two sets of dies: (1) a piercing and blanking die to show multiple-punch die operation and (2) a double-deck hemming die (folds edges) and beading die (rolls the edge) which can be used with or without wire inserted in the bead. Equipped with the exclusive Lodge & Shipley combination air clutch and brake, this machine will also have an optional auto-pause control accessory.

The company's high-production type Floturn machine at Chicago will be tooled for three different jobs to show the full range of shear-spinning capabilities: a stainless-steel cake stand base, a widely flanging shape which shows contour operation in kitchen utensils; a stainless-steel tumbler with straight sides for scientific laboratory equipment; and for military production, a 21-degree cone. Parts up to 12 inches in diameter, 15 inches long, can be handled. The machine on exhibition is identified as Model 12.

Circle 630 on Readers' Service Card

Cincinnati Lathe & Tool Demonstrates Tape-Controlled Turning and Drilling Machines

Booth 934

Applications of numerical control to turning and drilling operations will highlight the exhibit of the Cincinnati Lathe & Tool Co., Cincinnati, Ohio. Four tape-controlled machines that have not been previously shown will be on view. In addition to increases in production rates over standard methods, the machining demonstrations will show the unusually short setup time required to keep numerically controlled equipment running. It is this latter advantage which brings remarkable economies to short-run production work.

The Cintimatic turret drill, Fig. 1, has completely automatic control to do a wide range of work with minimal jig and fixture requirements. Six tools may be selected at random from the turret. Selection is automatic by tape command, or it may be manually controlled. All six spindles are reversible so that they may be employed for tapping. Spindle reversal, when tapping, is automatic at the depth programmed on the tape.

A unique feature of the control system provides direct tape programming of hole depth. No compensation need be made on the tape for tool length or work height.

Both spindle speed and feed rate are tape-controlled for each spindle, with 100 feed rates from 0 to 100 ipm offered as standard equipment. In addition, a rapid advance and retract rate is provided. In the drilling cycle, the rapid advance is automatically stopped 0.060 inch above the work, and the programmed feed is then automatically engaged. However, until a spindle index or a full retraction is programmed, the spindle retracts to only 0.060 inch above the work, thus considerably speeding repetitive drilling operations.

Elimination of manual positioning

Fig. 1. All machine functions are tape-programmed by the Cintimatic controlled turret drill

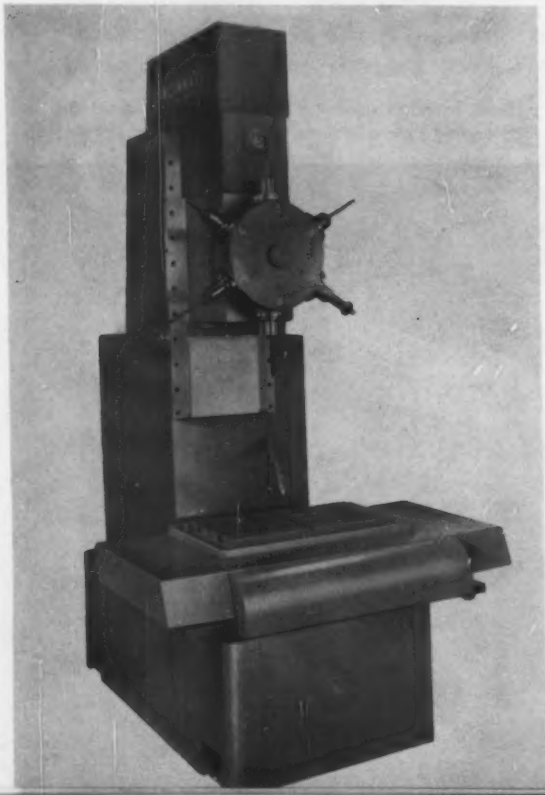
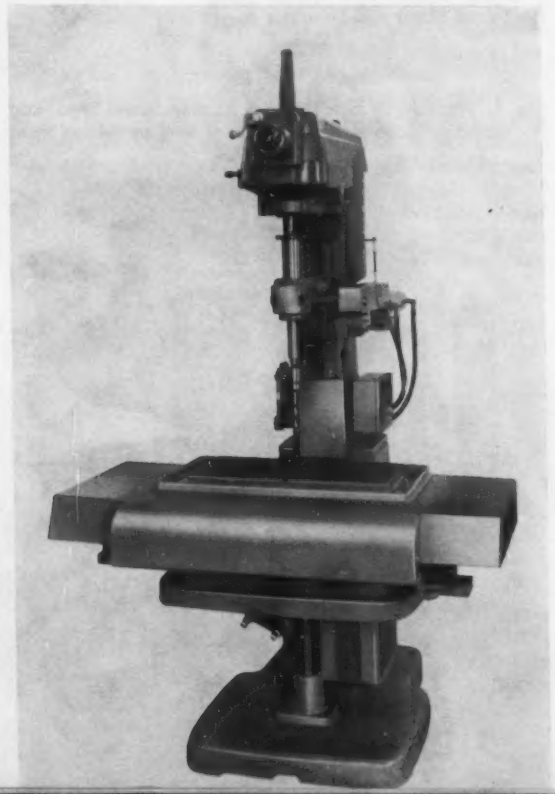
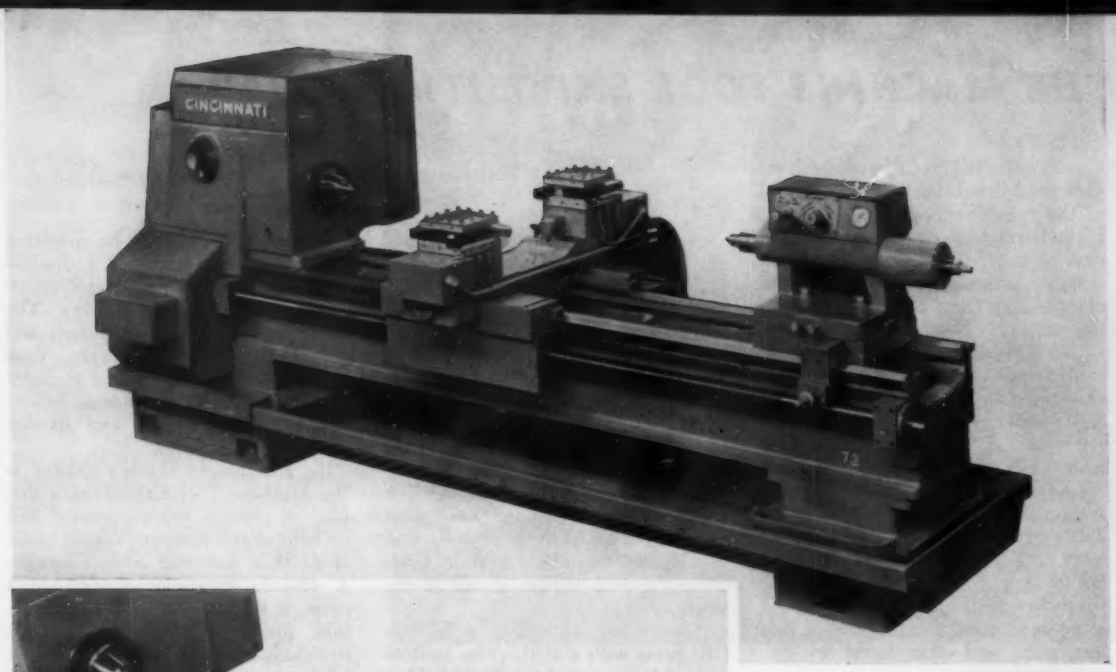


Fig. 2. Sliding head drilling machine has programmed spindle side-arm feed and table positioning





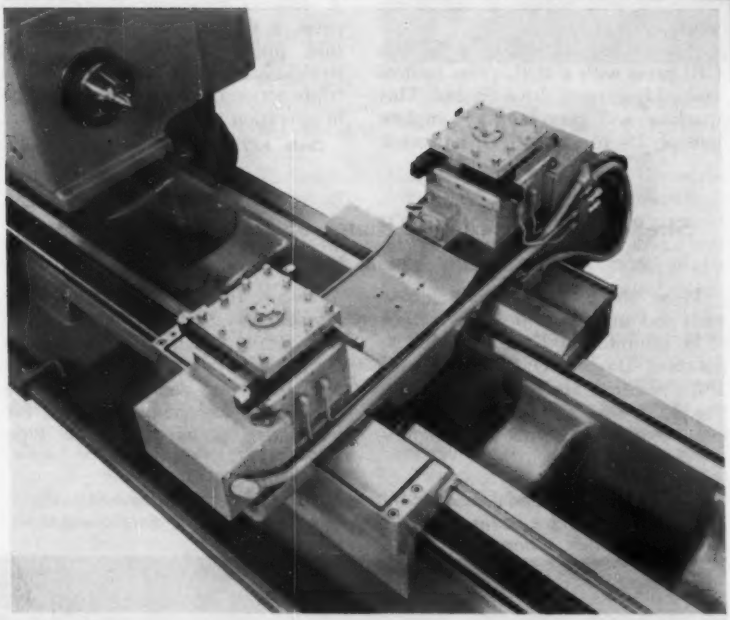


Fig. 3. (Above) Preset tools and tape programming help Cintimatic lathe operate at top productivity

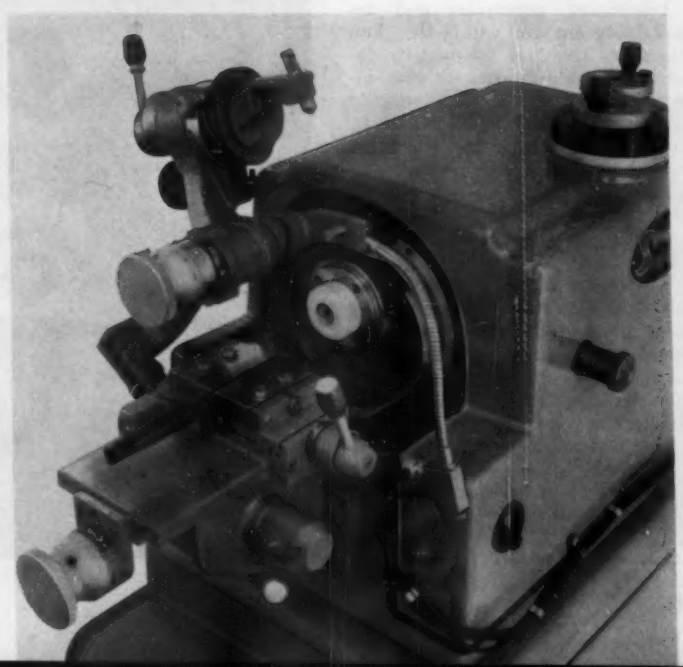
Fig. 4. (Left) Two turrets with four tools each are provided on this Cintimatic tape-controlled lathe

Fig. 5. (Below) Twist drill is held in position while Spiropoint grinding wheel generates the point in a combination of controlled motions

of work to spindle, plus reduction to a minimum in the need for jigs and fixtures, will be demonstrated by two Cincinnati numerically controlled sliding head drilling machines. These standard drills, a 24-inch medium-duty (Fig. 2) and a 25-inch heavy-duty model, are equipped with Cincinnati's numerically controlled work-positioning table. Positioning of the 12 1/2- by 25-inch table is controlled by an Acramatic tape-control console along two axes.

Additional mechanized operation is achieved on the 24-inch machine because it has a side-arm pneumatic feed for advance and retraction of the spindle. This feed mechanism is automatically activated by the tape control.

Versatility of both of these drilling machines is further extended by



Cincinnati's Infispeed variable spindle-speed drive. Push-button control of the spindle-speed change on the 25-inch machine, together with the ease of using the tape programming system, provides fast and simple change-over from one job setup to the next.

The Cintimatic numerically controlled lathe, Fig. 3, combines the speed and productivity of automatic equipment with the versatility and economy of toolroom lathes. All machining and operating functions are tape-controlled by the Acramatic system. However, change-over from one job to another seldom requires more than a few minutes. Designed for turning stepped shaft work, the Cintimatic will also perform boring and facing operations. Necks, chamfers, radii, and other forms are cut with form tools.

Key to the lathe's ability to economically handle short-run work is its unique tool turret system. Two four-tool turrets are available—one on the front and one on the rear of the cross-slide (Fig. 4). Selection of any one of the eight tools is automatic by tape command. The tools are preset in the turrets using accurate gages. As a result, no tool adjustment or resetting is required when changing from one work-piece to another. Tool position and feed rate on both the cross axis and the longitudinal axis, spindle speed, coolant flow, and cycle stop are all automatically programmed by taped command. Therefore, the operator has only to load and unload the work, insert the tape in the reader, and press a cycle start button to start the machining cycle for the average stepped shaft.

Positioning accuracies and repeatability are well within the close tolerances required by modern designs. Fine adjustments for compensation for tool wear are quickly made by a control called zero-shift, without changing the tape. This control allows the programmed cross and longitudinal axes to be minutely adjusted through the use of convenient handwheels mounted on the console.

A Spiropoint drill sharpener, see Fig. 5, will be used to apply spiral-point grind contours to twist drills. Particular emphasis will be placed on the application of this new drill geometry to numerically controlled drilling machines.

The machine will grind a twist drill to spiral-point geometry in less than a minute. It handles drills from 0.040 to 1 inch in diameter.

Circle 631 on Readers' Service Card

Danly Exhibits Presses and Accessories

Booth 1250

An automatic coil fed press and auxiliary equipment will be the main feature of the Danly Machine Specialties, Inc., Chicago, Ill., exhibit. This demonstration will include a 400-ton Autofeed press complete with a slide cushion; a skip type scrap cutter; a grip feed, adjustable while in motion; and a coil-loading car. A platform and ramp will be installed around the display to enable visitors to get a better view of the press in operation. The press will be equipped with controls and accessories, including a slide positioner, a load indicator, and a die light.

Also on display will be a 100-ton OBI press with a static-press control and eddy-current drive control. This machine will represent a complete line of 25- to 200-ton OBI presses.

Other attractions will be operating full- and half-models of a double-action underdrive press, and accessories for individual display. The latter will include: a standard and a 360-degree rotary cam limit switch; a dual air valve; a pressure control manifold; a tonnage indicator, proximity switch and motion detector.

In addition to Danly's exhibit at the Machine Tool Exhibition, a display of presses and equipment will be held at the company's main plant at 2100 S. Laramie Ave., Chicago. A 400-ton two-point double-action press, a 600-ton two-point straight-side press, a 400-ton two-point straight-side press, and a 2000-ton triple-action underdrive press will be in operation at the plant display.

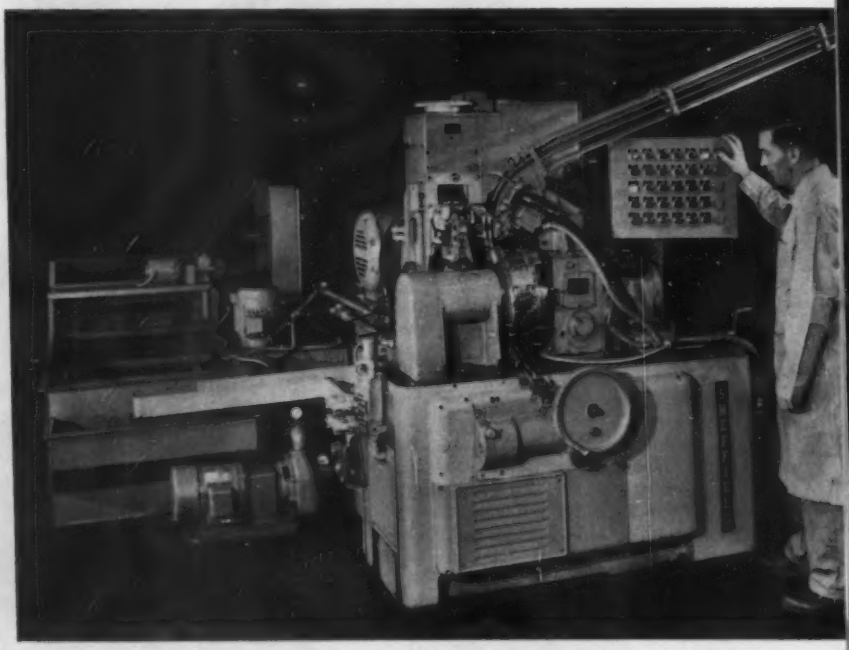
Circle 632 on Readers' Service Card

Sheffield to Show Wide Range of Machines and Gages

Booth 201

More than eighty-five machine tools and inspection instruments are to be exhibited by the Sheffield Corporation, Dayton, Ohio. The Model 182 Crushtrue Multi-Form machine, Fig. 1, is designed to automatically grind cylindrical forms and grooves on two or four parts simultaneously at wheel speeds of 9200 sfpm. A rapidly rotating cage and chuckless work-head system reduce nonproductive loading and unloading time to as little as one-half second for two parts. An automatic box type

Fig. 1. Sheffield Model 182 Crushtrue Multi-Form machine automatically grinds forms and grooves on two or four cylindrical parts simultaneously



Crushtrue device is used to form the grinding wheel as well as to redress it at predetermined intervals. Maximum wheel spread is 5 1/4 inches, while maximum wheel diameter is 20 inches. The largest diameter work-piece accommodated is 2 1/4 inches.

The Model 181-A Crushtrue roll grinder, Fig. 2, is designed to grind multiple grooves simultaneously in rod mill rolls up to 60 inches long and 14 inches in diameter. Size of the grinding wheel is 4 inches wide and 20 inches in diameter. This machine features fully automatic grinding and wheel crushing. It has variable speed control for automatic fast and slow feed of the wheel into the work, and an automatic plunge-grinding device with 1-inch rapid approach and retraction of the wheel. Wheel speeds are 1150, 1270, and 1390 rpm. Maximum longitudinal adjustment is 24 inches—table swivel is 5 degrees in either direction.

Fig. 2. Model 181-A Crushtrue roll grinder forms multiple grooves in rolls up to 60 inches long and 14 inches in diameter

An improved Model 181 Crushtrue Multi-Form grinder (Fig. 3) uses a 4 1/2-inch wide, 20-inch diameter, dressed wheel to grind multiple diameters and forms on cylindrical work-pieces up to 10 inches in diameter and 24 inches long. It is equipped with automatic size control that causes the wheel-head to retract at final size. Featured on this machine is variable speed control for automatic fast and slow feed of the wheel into the work, an automatic plunge-grinding device, a swivel type work-table, and a table-locking device.

Cylindrical forms such as circular form tools, ball-bearing races, servo-sleeves and slides, and seaming rolls are typical parts ground on the Model 109A precision Crushtrue cylindrical form grinder shown in Fig. 4. The machine has a capacity of 12 inches between centers and will grind a maximum diameter of 4 inches with a 14-inch wheel, while accommodating work-pieces up to 7 inches in diameter. Adjustable work speed ranges from 64 to 1050 rpm. The machine has an electromechanical, cam-controlled, automatic infeed device. Rate of infeed is infinitely variable from 0 to 1/4 ipm.

Precision threads (Class 3, eight to forty per inch), worms, and cylindrical forms can be either plunge- or traverse-ground (threads up to eighty per inch are traverse-ground) on the Model 103 precision thread and form grinder illustrated in Fig 5. The wheel is formed by Crushtrue dressing, or by single-rib or multiple-rib diamond dressers. Parts up to 24 inches between centers can be accommodated—a maximum thread length of 14 inches and a maximum thread diameter of 3 inches can be ground. Maximum thread length that can be plunge-ground is 1 1/4 inches. Helix adjustment to either side of center is 20 degrees. Wheel-head speeds are 1750 and 2000 rpm. The machine is equipped with a lead-varying mechanism.

The Model 140 precision gear-grinding machine shown in Fig. 6 grinds external spur and helical gears of from 8 to 100 diametral pitch. Hardened-steel gears in either preformed or solid blanks can be

Fig. 3. Multi-Form machine grinds multiple diameters on work up to 10 inches in diameter and 24 inches long

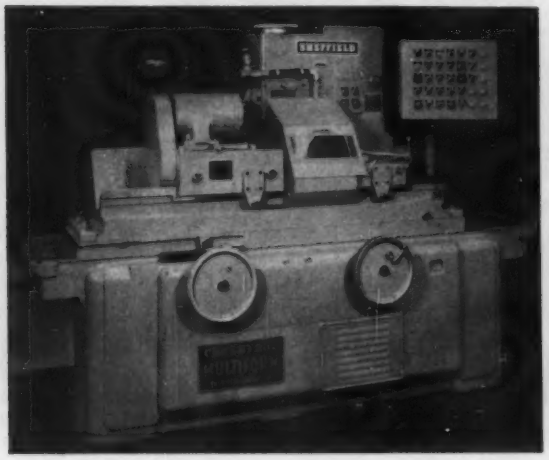


Fig. 4. Precision cylindrical form grinder for such parts as circular form tools, ball-bearing races, and servo sleeves

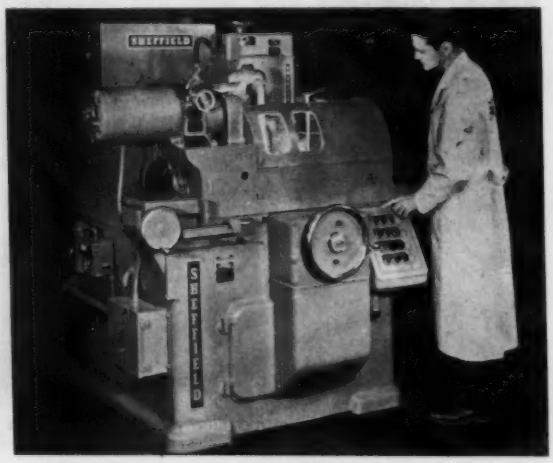


Fig. 5. Model 103 precision thread- and form-grinder accommodates parts up to 24 inches long

Fig. 6. Model 140 precision gear-grinding machine for external spur and helical gears

ground individually, or a number of parts of the same type can be handled simultaneously. The grinding operation is similar to hobbing, and the wheel receives its basic rack form by Crushtrue dressing. Maximum work size accommodated is 8 inches in diameter with a 5-inch wide face. The between-centers capacity is 15 inches. Change gears permit from 4 to 192 teeth to be ground. Maximum helix-angle adjustment of the wheel-head is 45 degrees in either direction.

Cylindrical and flat work-pieces, form tools, templates, profile gages, cams, dies, and Crushtrue rolls can be ground directly from a drawing of 50-to-1 ratio on the Model 122 Micro-Form grinding machine, Fig. 7. The machine will grind flat work up to 4 inches thick and 10 inches wide of any length. Cylindrical parts up to 5 inches in diameter and 6 inches long are handled with a circular grinding accessory. A direct-reading optical vernier has been added to the lateral and longitudinal slides to permit reading table position to 0.0001 inch.

The Model 121-C Micro-Form machine, Fig. 8, was developed to grind slider lands (in hydraulic servovalves) to match cylinder ports. This machine has a grinding station for the slider and a viewing station for the sleeve, with each station having a separate adjustable work-table, set of centers, and microscope. The two work-tables are locked together when the land and port are in correct relationship for grinding. Wheel size is 7 inches in diameter and 1/4 inch wide. A work diameter of 5 inches can be handled with this wheel. Distance between centers is 7 1/2 inches. Accessories include Precisionaire gaging, 30-power combination viewing screen and scope, and dust-removing unit.

Circle 633 on Readers' Service Card

Fig. 7. Model 122 Micro-Form machine grinds such items as circular form tools and templates directly from drawings

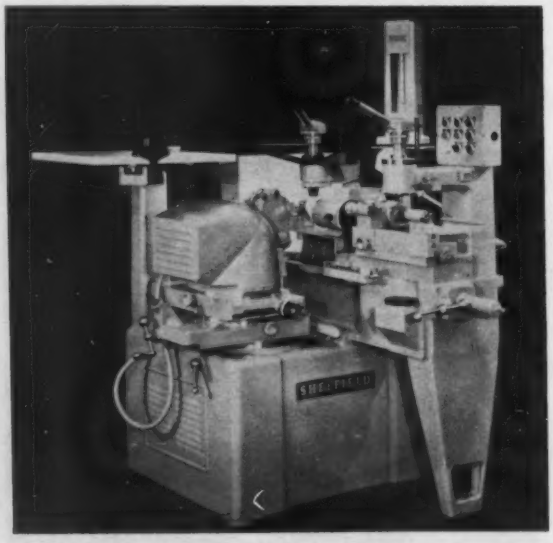


Fig. 8. Model 121-C Micro-Form machine for grinding slider lands to match cylinder ports in hydraulic servovalves

Natco Displays New Lines

Booth 1205

National Automatic Tool Co., Inc., Richmond, Ind., will display seven machines representative of entire new lines of production equipment. The machines to be shown include a mechanical and a hydraulic honing machine; an automatic centering machine; a hydraulic press brake; a numerically controlled drilling, tapping, and milling machine; a Type FB line of large, multiple-spindle drilling-tapping machines; and a type H-6 line of small, multiple-spindle drilling-tapping machines. In addition, several lines of building-block machining units will be exhibited.

The Natco mechanical honing machine (Fig. 1) is designed to perform production honing of bores up to 3 inches in diameter and 3 inches in length. Typical work would be connecting-rod, gear, and rocker arm bores. Rotational speeds of 200 to 800 rpm and reciprocation from 60 to 240 strokes per minute are possible with this equipment. Stroke length is adjustable in desired increments. The machines may be used singly or as multiple heads on a common base and can be integrated into a transfer line. They were designed for use with Jes-Cal honing tools which employ an automatic, plug-gage method of size control, and will carry the Natco-Jes/Cal emblem.

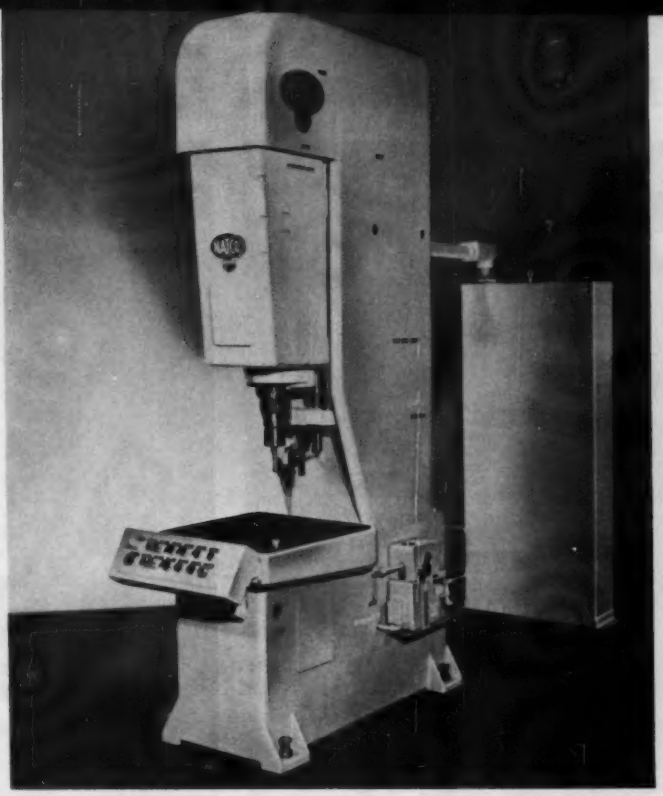


Fig. 1. Mechanical honing machine for heavy-duty production

Similar in purpose to the mechanical machine, the hydraulic unit to be introduced is built for heavy-duty production honing. It has a 24-inch stroke and will hone bores up to 7 1/2 inches in diameter and 9 1/2 inches in length. Equipped with pick-off gears for a wide selection of rotational speeds and stroke rates, the machine is also designed for Natco-Jes/Cal tools and will carry this emblem. Typical work-pieces are cylinder bores and liners. It can deliver up to 15 hp at the tool, and can be assembled into multiple-spindle units and integrated into automatic transfer lines.

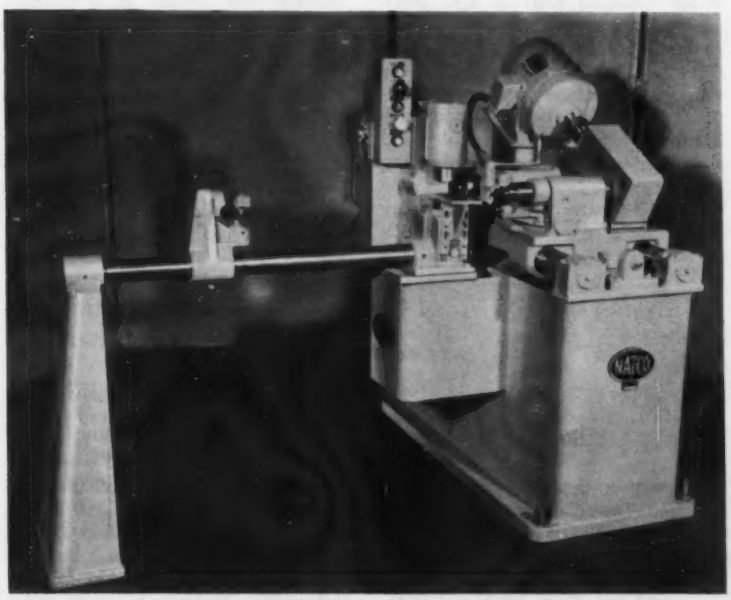
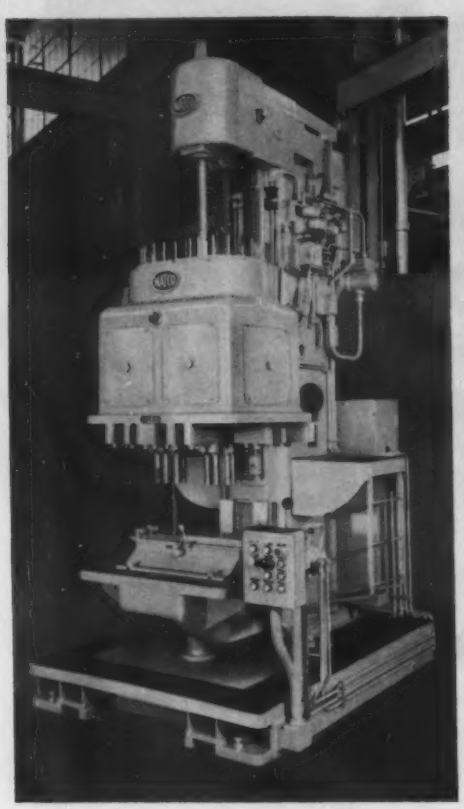


Fig. 2. Automatic centering machine to be introduced by Natco

The numerically controlled drilling, tapping, and milling machine is a single-spindle unit incorporating a numerically controlled positioning table. In addition, it has numerical control of head and spindle for depth, as well as of spindle speeds, feeds, and reversal for tapping. The machine is equipped with a quick-change tool-holder so that preset tools can be changed during the brief hole-to-hole movement intervals. The drill is also provided with a numerically controlled "tool presenter."

Designed for work-pieces up to 3 inches in diameter, the automatic centering machine (Fig. 2) mills work-piece ends, deburrs them, and drills centers of within 0.002 inch of specified depth. It will handle parts up to 3 feet long, or longer, with an extension work-rest.

The hydraulic press brake to be introduced has a 200-ton capacity and features equalization of off-center forces in the ram both by means of hydraulic blocking valves and a mechanical torsion bar. Ram alignment is maintained by cylindrical guides, and the hydraulic cylinders



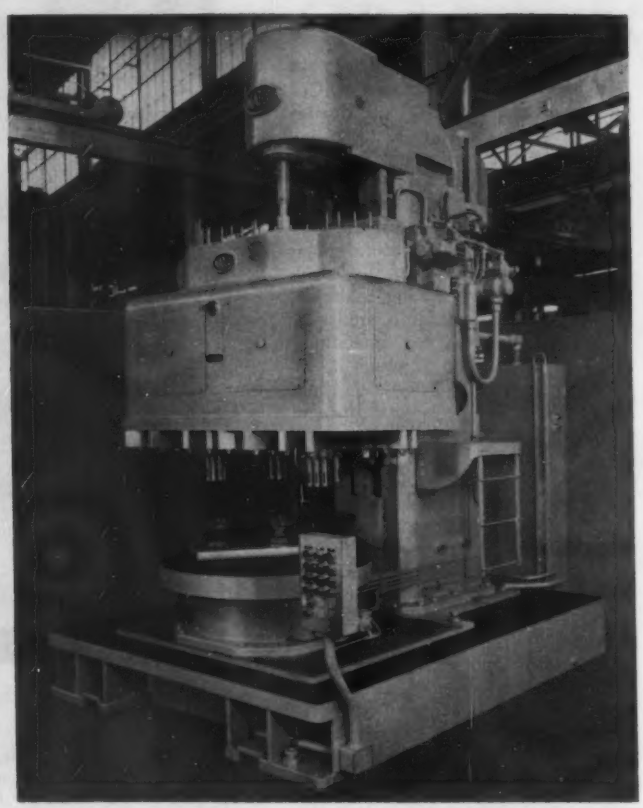


Fig. 3. (Left) Model F2B multiple-spindle drilling-tapping machine equipped with straight-line indexing fixture.
Fig. 4. (Right) Natco F4B multiple-spindle drilling-tapping machine equipped with three-station rotary table

are doubly mounted to both the throat and top of the C-frame. It will be available in a variety of tonnages and sizes.

A new FB line of multiple-spindle drilling-tapping machines will be exhibited. These large vertical machines have provision for both drilling and tapping in the same head. Electric clutches permit shifting from drilling to tapping spindles, the selection being made either automatically or by push-button. The F2B machine seen in Fig. 3 will be displayed equipped with a straight-line indexing fixture. This size machine has a 19- by 24-inch drilling-tapping area, a 7 1/2-hp spindle drive, and delivers 8100-pound thrust. The second machine to be shown is an F4B (Fig. 4) having a 30- by 54-inch drilling area and delivering 30 hp and 25,000 pounds of thrust at the spindle. It will be demonstrated with a three-station rotary table. Other sizes are available.

Another line of multiple-spindle drilling-tapping machines to be demonstrated is the H-6 series. This small multiple-spindle line has been redesigned with electric clutches to permit instantaneous shifting from drilling to tapping on the same machine (manual shift is also available). Another change is the built-in feed-rate indicator which reads directly in inches per minute. Of the two H-6 machines to be demonstrated, one will be equipped with a three-position rotating table, and the other with a five-position sliding table.

The company will also display four series of machining units which will all be demonstrated on an operating transfer line. They include: FA units which are for vertical operation and consist of a column, slide, head, and self-contained hydraulic power supply; FF Holeunits which are for operation at any angle and are mounted on thin, flat bases, and have self-contained hydraulic power supply; FG units which conform to JIC standards for building-block transfer machine elements; and FA units for milling.

Circle 634 on Readers' Service Card

Nebel Unveils Novel Concept in Turning Practice

Booth 1319

An unusual lathe, capable of infinitely variable spindle speeds between 43 and 3500 rpm, will be outstanding in the exhibit of turning and shaping machinery by Nebel Machine Tool Corporation, Cincinnati, Ohio. The recently added line of Micro-Turn lathes embodies the machining concept of infinite spindle speed variation combined with coaxial headstock design. The design is intended to result in the delivery of maximum horsepower and quality of finish over the entire range of spindle speeds.

The infinite speed selection of the MT 1308 and MT 1510 lathes, Fig. 1, is easily controlled by increase and decrease push-buttons, with indication on a direct-reading tachometer. The infinite speed range and constant horsepower are pro-

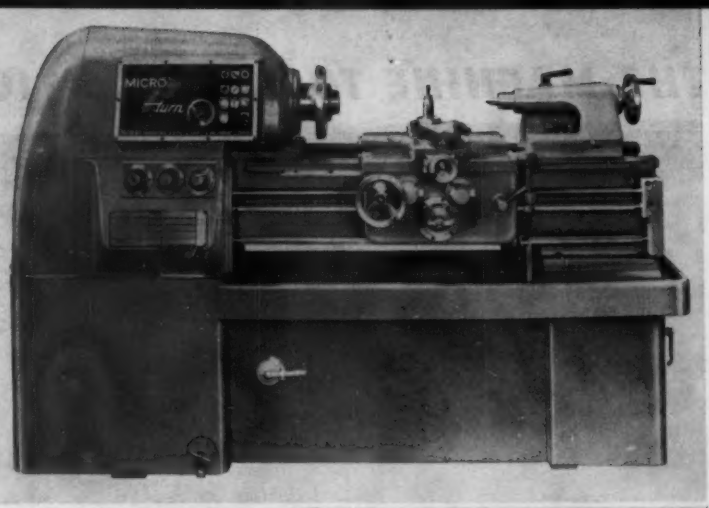


Fig. 1. (Right) Infinitely variable spindle speeds at maximum torque are the result of the Micro-Turn lathe headstock

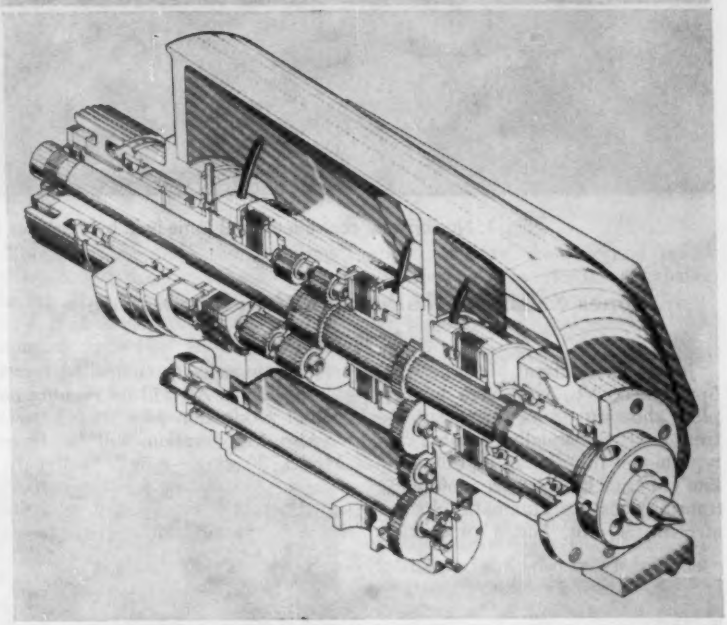


Fig. 2. (Center) Details of coaxial headstock used in Micro-Turn lathes

vided by a proven, highly efficient mechanical speed variator driven by an alternating-current motor which has hardened alloy steel members to insure long life. Because the drive delivers constant horsepower through the entire speed range, high torque is insured at low speeds for heavy cutting. A torque responsive mechanism is built-in to prevent slippage under starting or shock leads, while the quiet, vibration-free drive assures a fine finish and improves tool life.

The exclusive coaxial headstock is designed around a single shaft surrounded by a floating ring and planetary gear arrangement, Fig. 2. Inherent benefits of this construction are: low inertial effect for quicker acceleration and deceleration, prolonging clutch and brake life; simplified alignment further aided by a self-centering effect; and fewer revolving parts for greater smoothness and efficiency of power transmission.

An electronic duplicating attachment applicable to the complete line of shapers made by the Smith & Mills Shaper Division of the Nebel Machine Tool Corporation will also be introduced. This attachment, known as the Voss electronic duplicator, accurately controls vertical table travel while the table itself is feeding horizontally. The stylus follows the contour of the template, with the table automatically and electronically synchronized. Response is so sensitive that accuracy is limited only by the mechanical characteristics of the work.

The duplicator, as seen in Fig. 3, in no way interferes with the normal operation and capacity of the shapers, which offer from 17 to 37 inches maximum stroke. Full vertical table travel up to 15 inches is available when the duplicator is not in use. The electronic control unit is mounted in a separate cabinet and is controlled by a movable pendant station for operator convenience.

Circle 635 on Readers' Service Card

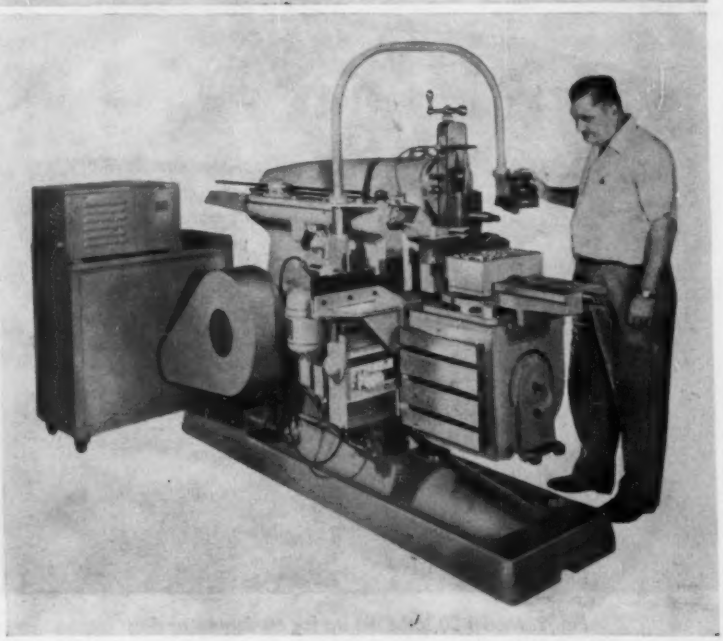


Fig. 3. Voss duplicator on Smith & Mills shaper produces accurate contours at rapid cutting rates

Fig. 1. Numerically controlled turret lathe built by the Jones & Lamson Machine Co.

Jones & Lamson Lathes and Grinding Machines

Booth 839

Jones & Lamson Machine Co., Springfield, Vt., will have a complete showing of its turret lathes—from a No. 3 manually operated ram type model through an entirely new line of machines with automatic transmissions; an automatic electro-mechanical unit; and a production model numerically controlled turret lathe, Fig. 1. All will be running on actual production jobs.

Also in operation will be three Model 30 single-spindle automatic turning and tracing lathes, each set up differently: one, Fig. 2, as a 60-degree tracing lathe performing high-production work on steering knuckles; another, as a multiple-slide, single-spindle automatic machining crankshafts; and the third, as a multiple-tool, two-dimensional tracer processing different sizes of gear blanks. The Model 30 is of bridge-bed design for rigidity, versatility of tool motion, ease of loading and unloading, and ease of chip removal.

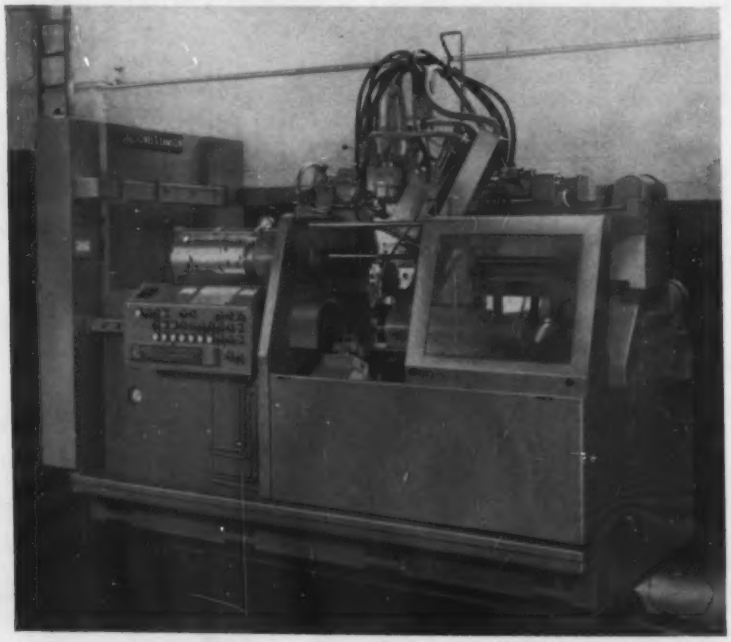


Fig. 2. Model 30 lathe set up for 60-degree tracing

A variety of components are available to adapt the basic machine to specific requirements, such as a hydraulic tailstock for between-centers work; a rear facing, forming, and turning slide; front bevel facing or necking slides for the lower bed; and turning and tracing slides for the upper bed. Two headstock transmissions, two spindle noses, and three bed lengths are available.

Another machine being exhibited for the first time is a Model F thread grinder, Fig. 3, designed for high-production operations on small parts, such as taps, with manual or automatic handling. A precision thread- and form-grinding machine originally conceived for the electronics industry, but with broad application in other areas, will also be unveiled at the Exposition.

The precision boring machine, Fig. 4, is a relatively new member of the J&L line, and combines high performance with low initial cost. It will be demonstrating how inside and outside surfaces of stainless-steel cups can be completely machined in a twenty-second cycle.

The company's 20- by 20-inch

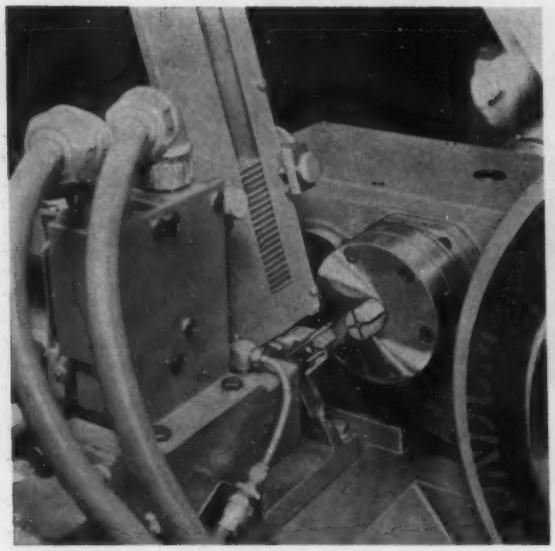


Fig. 3. Model F grinder set up for threading taps

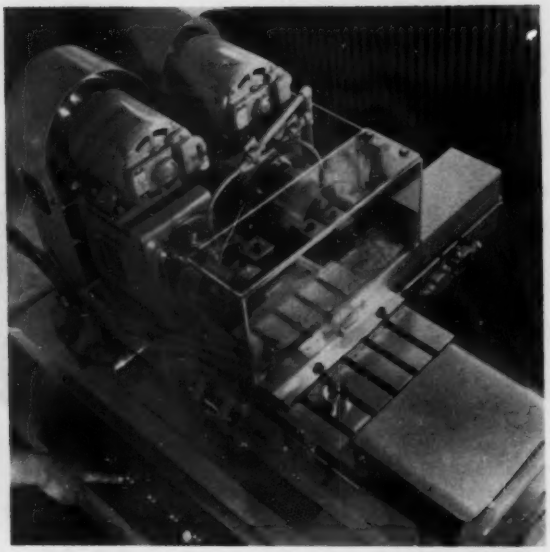


Fig. 4. Low-cost, double-spindle precision boring machine

positioning table, Fig. 5, will be operating under 1-inch, eight-channel tape control. It will be set up in conjunction with a standard post drill.

Other highlights of the J&L exhibit will be automatic form grinders with wheel dressers of cemented-diamond particles which operate without interrupting the grinding cycle; a gun-drilling machine producing a 3/16-inch hole 3 inches deep; optical inspection with a high-intensity reflection unit (providing five times the illumination available from a filament type bulb) and a new light concentrator; and the "no approximations" tangent and radial self-opening die heads, collapsing and solid-adjustable taps, and Modern-Magic chucks and collets.

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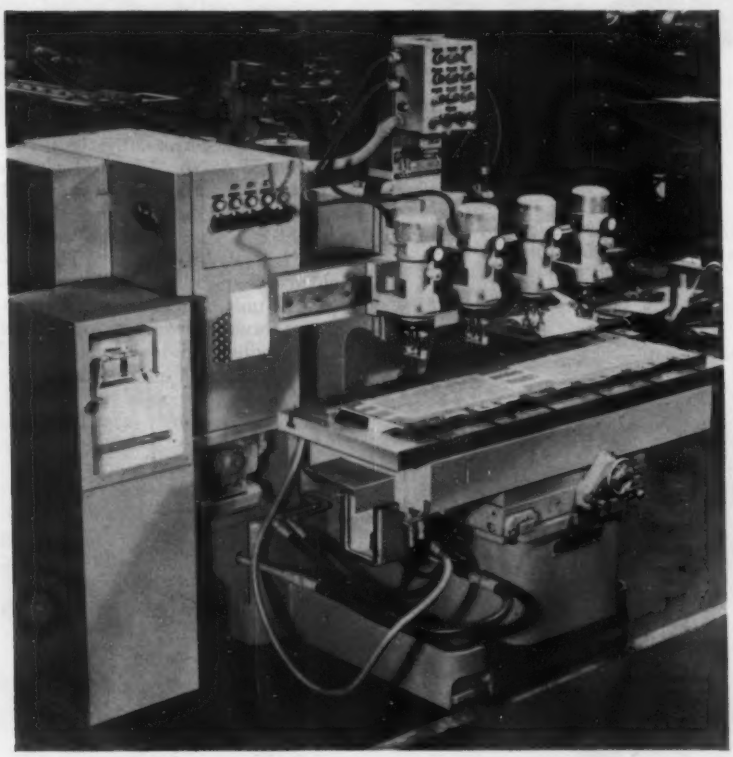

Fig. 5. Jones & Lamson tape-controlled positioning table

Eastern to Introduce New Products

Booth 745

The Eastern Machine Screw Corporation, New Haven, Conn., will introduce and display many new products in addition to their standard line. The Loungway rise-and-fall abrasive belt grinder, recently acquired with the complete facilities and product line of Abrasive Machinery Co., will be displayed and demonstrated for the first time. This belt grinder will be regularly manufactured and distributed as one of Eastern's products.

An H & G threading machine completely equipped with five-chaser insert type die-heads, and an H & G thread-rolling machine for second-operation thread rolling on small parts or on through-feeding of long bars, will be demonstrated. Other H & G equipment to be displayed includes: an automatic screwdriver; a line of insert-chaser die-heads; and a miniature solid adjustable die measuring less than 1 inch in diameter. This die is for use on Swiss type automatics and is capable of producing quality threads as small as No. 000.

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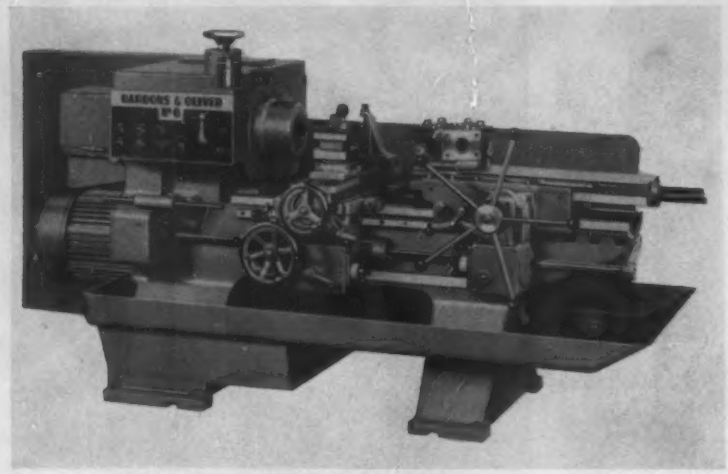

Fig. 1. Bardons & Oliver No. 6 universal ram type turret lathe

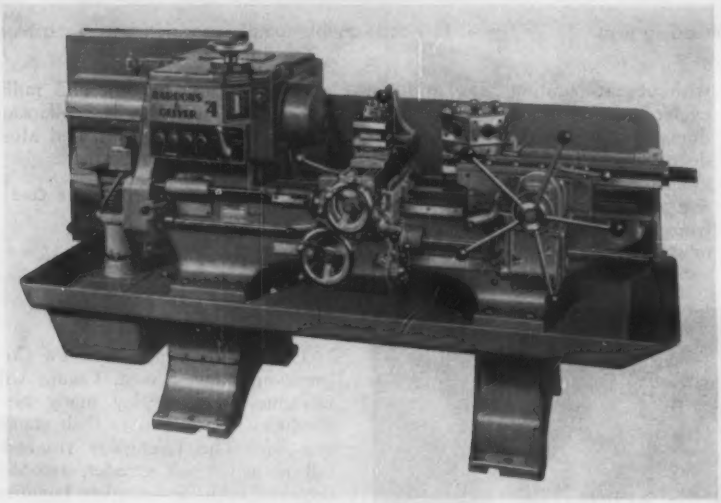

Fig. 2. This No. 4 universal ram type turret lathe is available with a top spindle speed of either 1550 or 2000 rpm

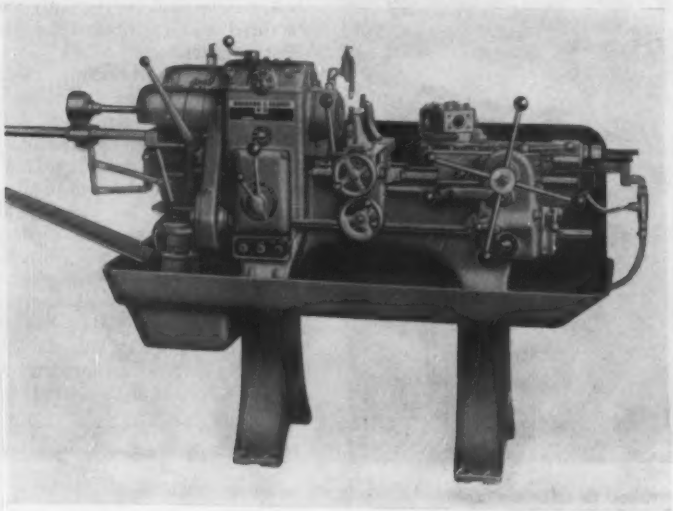

Fig. 3. Bardons & Oliver geared electric ram type turret lathe has a 3500-rpm headstock and a 1- or 1 1/4-inch spindle capacity.

Bardons & Oliver to Exhibit Three Turret Lathes

Booth 741

Three turret lathes and an automatic cutting-off lathe are to be introduced by Bardons & Oliver, Inc., Cleveland, Ohio. The No. 6 universal ram type turret lathe shown in Fig. 1 offers a 3-inch spindle capacity for heavy-duty bar work, a 5-inch spindle capacity for light-duty bar work, and a 21 1/8-inch swing over the bedways. The headstock provides sixteen geared spindle speeds, constant horsepower (optional to 30) at all speeds, a 50-to-1 speed range, spindle-speed preselection, and automatic spindle-speed changes.

Twelve fast feed changes are provided for the cross-slide, carriage, and hexagon turret. Compact aprons; "easy-action" feed-engagement levers; single-dial, direct-reading feed selectors; and powered rapid traverse of the cross-slide afford simple and fast operation.

A No. 4 universal ram type turret lathe, Fig. 2, offers either 2- or 2 1/2-inch spindle capacity and has an 18 1/8-inch swing over the bedways. A new automatic spindle-speed change mechanism provides faster and more positive shifting. Hardened and ground, splined gear shafts in the apron increase metal-removing capacity of the tool-carrying units. No. 4 can be supplied with a top spindle speed of either 1550 or 2000 rpm.

The third turret lathe to be exhibited is a No. 2 geared electric ram type, Fig. 3. It features a 3500-rpm headstock and provides either a 1- or 1 1/4-inch spindle capacity with a 13 1/2-inch swing. This machine is equipped with a remote-control unit that automatically programs forward-reverse movements of the spindle, high-low spindle-speed changes, opening and closing of the collet, and operation of the bar feed.

Also to be shown is an improved No. 33 automatic cutting-off lathe designed to form, chamfer, groove, and cut off pipe, tubing, or bar stock. A positive-stop slide attachment with time delay allows forming to close tolerances. The direct-acting remote-control unit on the stock stop allows cutting off unlimited lengths.

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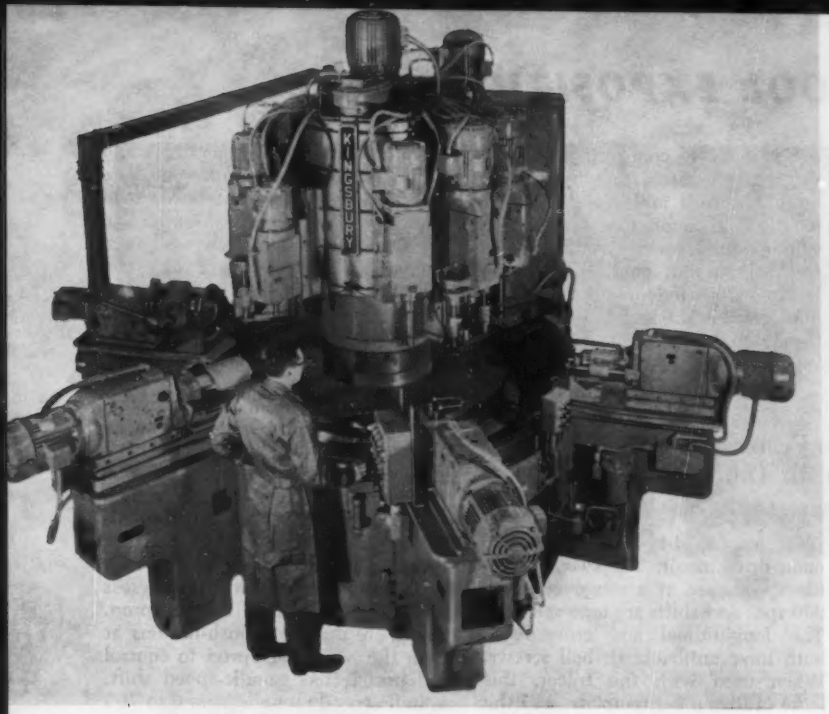


Fig. 1. Twelve-station drilling and tapping machine has 63-inch index-table

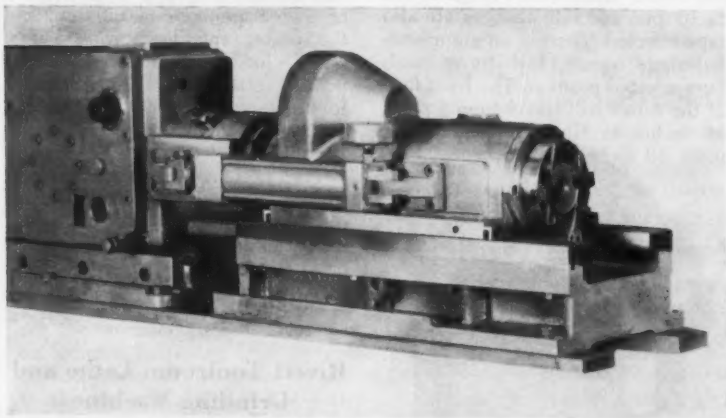


Fig. 2. Model 168 boring head provides rigid support for large tools working to close tolerances

Kingsbury Drilling, Boring, and Tapping Equipment

Booth 731

Three automatic drilling and tapping machines, a boring head, an angular-feed drill head, and an oscillating head will be exhibited by the Kingsbury Machine Tool Corporation, Keene, N. H. The automatic drilling and tapping machine illustrated in Fig. 1 has a 63-inch index-table and a center column. It has twelve stations and seventeen automatic units—ten on the center column and seven on wing bases—and can perform a wide variety of operations in one chucking of the work-piece. Units on this machine are of seven different models, four for drilling and three for tapping, and each has a cam feed for uniform, accurate cycling. Capacities range from 1/2 to 5 hp, with stroke lengths up to 7 inches. Using standard attachments, such operations as milling, boring, and recessing can be performed. Of the two other drilling and tapping machines to be displayed, one has a 40-inch index-table with no center column and the other a 20-inch index-table with no center column.

The Model 168 boring head shown in Fig. 2 (being driven by a Model 22 drilling unit) has a solid housing moving in a slide to provide rigid spindle mounting for large tools working to close tolerances. It is also available with a coolant distributor for gun-reaming. Maximum stroke is 7 inches with a long-stroke unit (shown), or 3 1/2 inches with a standard 22 unit.

Angular-feed drill head (driven by a Model 16 drilling unit) Fig. 3, permits operations to be performed

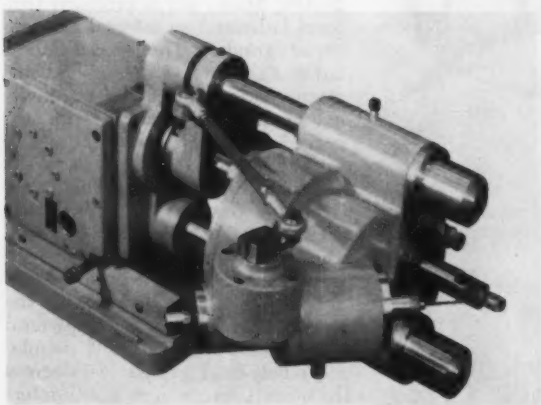


Fig. 3. Kingsbury angular-feed drill head is used for operations performed at a fixed angle

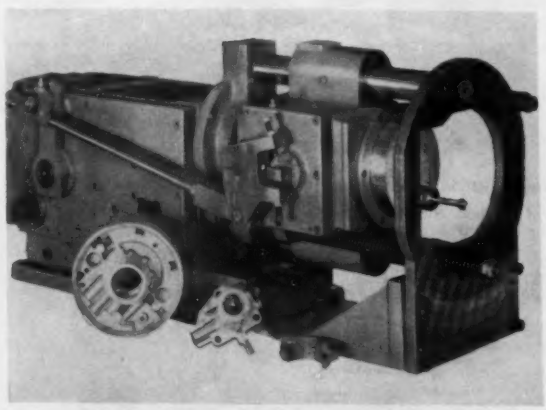


Fig. 4. Oscillating head moves through an angle of 30 degrees to perform various milling operations

at a fixed angle. A special head is required for each application.

An oscillating head is driven by a Model 16 drilling unit in Fig. 4. The three parts in front show typical operations performed by this head. Oil pockets have been milled in the large holes of a transmission-shaft support (left) and a governor body (center), and a notch has been milled in a connecting-rod cap (right). The oscillating head slides on guide rods and has the stroke length of the unit that drives it. A cam-operated lever on the side of the drilling unit controls the oscillating stroke independently of the quill stroke. Maximum oscillation is through an angle of 30 degrees.

Circle 639 on Readers' Service Card

American Tool Exhibit to Feature Engine Lathe Combining Tracer with Tape Control

Booth 381

Simplicity plus versatility in turning are the embodiments of an advanced control system built into a 50-hp lathe by American Tool Works Co., Cincinnati, Ohio. This machine, Fig. 1, has a new General Electric numerical control system that uses standard eight-channel punched tape. The combination of an electronic duplicating system with tape-controlled, discreet positioning eliminates the need for complex and expensive computing and programming equipment. The lathe is able to turn step shafts, as well as contours, fillets, radii, tapers, and other free forms.

It is powered by a 50-hp, constant torque, 4-to-1 variable-speed main drive motor. The twenty spindle speeds are in a range of 50 to 900 rpm and shifts are tape-selected. The longitudinal and cross feeds both have antibacklash ball screws. When used with the tracer, this lathe utilizes a flat template, and the tracer system is a 360-degree or two-dimensional General Electric. There are twenty feeds with a range of 1/2 to 16 ipm, and rate changes are also tape-selected. There is an automatic-indexing, square tool turret with tape-selected position. The front face of the turret will travel from a point 10 inches in front of center to a point 10 inches behind center.

Fig. 1. Tape and tracer controls combine advantages for economy of operation in the new American Tool lathes

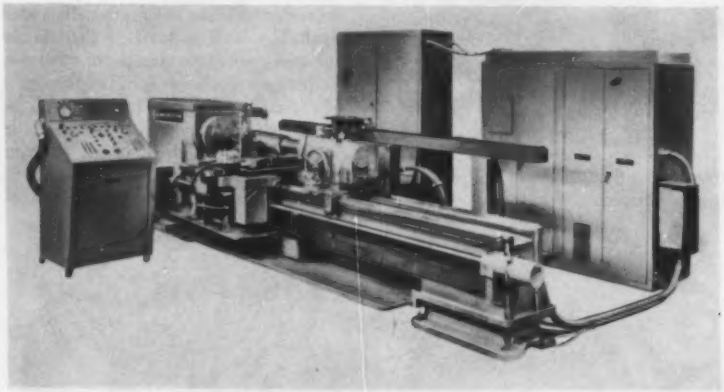
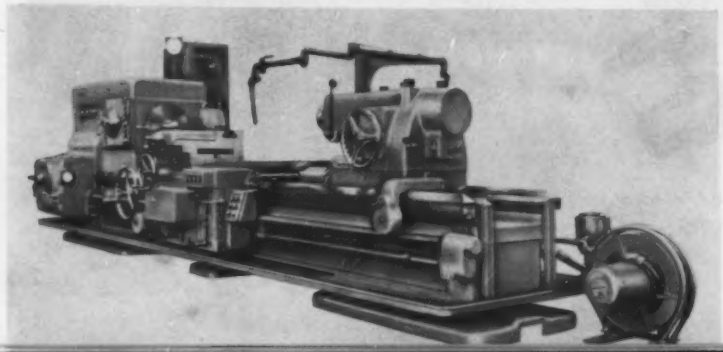


Fig. 2. Model 4025 Pre-Select engine lathe features silent shifting of gears



Theoretically, one operator could run several of these lathes because his full function would be to load the lathe, hit the push-button to start the machining cycle, and then unload after completion of the cycle. All other functions are under control of the tape system and the electronic tracer. Positioning of the template fillets is simplified by push-button control of the carriage and slide movements. This enables the operator to adjust the slides to the proper template location.

Model 4025 Pre-Select engine lathe (Fig. 2), also on demonstration, has a forty-eight-speed head and is equipped with a preselect and hydraulic spindle-speed shift with push-button control of both cross and longitudinal feed at the apron. There are duplicate push-buttons at both the head and apron to control the preselected spindle-speed shift. Spindle-speed range is from 6 to 700 rpm. The tool-holder will take a 2-by 2-inch shank. The front spindle bearing has a radial load capacity of 80,580 pounds at 100 rpm, and the center spindle bearing has a radial load capacity of 61,600 pounds at 100 rpm. The tremendous front bearing capacity is provided so that heavy chucking work can be handled.

The preselective hydraulic gear shifting is absolutely silent, the result of a unique system of oscillating the gears during shifting. There can be no clashing.

Circle 640 on Readers' Service Card

Rivett Toolroom Lathe and Grinding Machine

Booth 1210

Among the items to be exhibited by Rivett Lathe & Grinder, Inc., Boston, Mass., are a precision toolroom lathe and an internal and universal grinder. The Model 1020S lathe, Fig. 1, is a two-in-one machine that combines the sensitivity of an instrument lathe with the ruggedness necessary for the use of carbide cutting tools. It will take a 1/4-inch deep cut in cold-rolled steel at a feed of 0.020 ipr. Tolerances of 0.0004 inch can be held. The lathe is available in 20- and 30-inch centers.

Setup time is reduced with the Model 1024 internal and universal grinder shown in Fig. 2. A double-end wheel-head swivels 180 degrees for quick conversion to either internal or external work. Holes up to 9 inches in diameter and external work up to 12 inches in diameter

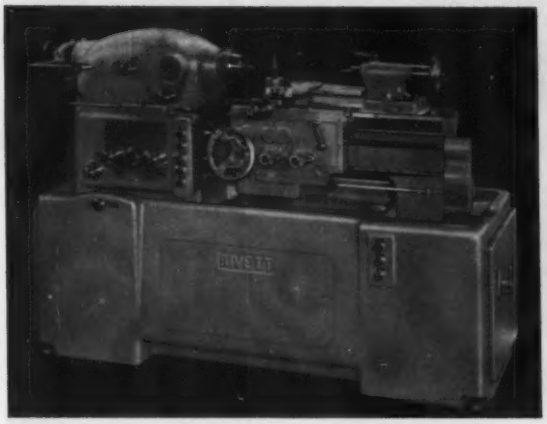


Fig. 1. Rivett precision toolroom lathe combines the features of an instrument lathe and an engine lathe

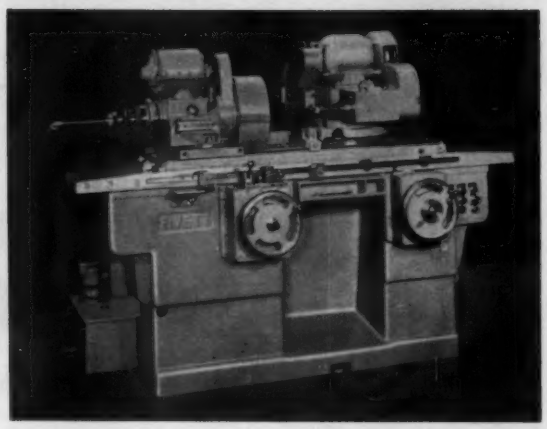


Fig. 2. Internal and universal grinding machine quickly converts to either internal or external work

Fig. 3. Rivett 60 series precision speed lathe features one-motion control of spindle action

can be accommodated. Tolerances on ground holes are held to plus 0.0003, minus 0.0000 inch.

Also to be exhibited is a 60 series precision speed lathe, Fig. 3, featuring one-motion control. A single lever starts the spindle, selects any speed up to 4800 rpm, changes speed during operation, or instantly stops or reverses spindle rotation.

Among the other items to be shown is a manufacturing lathe, a precision speed lathe, a turret lathe, a screw-cutting lathe, an armature-turning lathe, and various air and hydraulic valves and cylinders.

Circle 641 on Readers' Service Card

Buhr Exhibits Building-Block Units Conforming to Special Transfer Machine Standards

Booth 1440

Industry's first public demonstration of equipment built to the new Special Machine Tool Standards will be given in the booth of Buhr Machine Tool Co., Ann Arbor, Mich.

Basic equipment to be shown in operation includes two- and three-way multiple-operation machine tools built to the new standards. The regulations govern such important factors as the mounting and attaching surfaces of main bases, wing bases, feed units, horizontal angular adapters, angular columns, and the bolting patterns of these units, as well as work loading height.

The machines will be linked by automatic transfer, processing tractor transmission housings weighing approximately 150 pounds each. First operations performed by the two-way Buhr unit include semifinish and finish cross-facing; semifinish boring, counterboring, and chamfering on the bell end of the housings; as well as plunge facing, boring, counterboring, and chamfering on the small end. After the transfer, the three-way machine unit drills and chamfers the side bracket holes; drills and chamfers four bracket holes and all flange holes on the small end of the housing; as well as drilling flange holes on the bell end, and subland drilling and reaming three additional bolt holes on the large flange.

The building-block machines will introduce engineering advancements in areas not covered by the standards. The newly designed Buhr hydraulic way type feed units, for example, provide a 60 per cent increase in the rate of rapid traverse, a compact hydraulic power package, and a 50 per cent increase in struc-

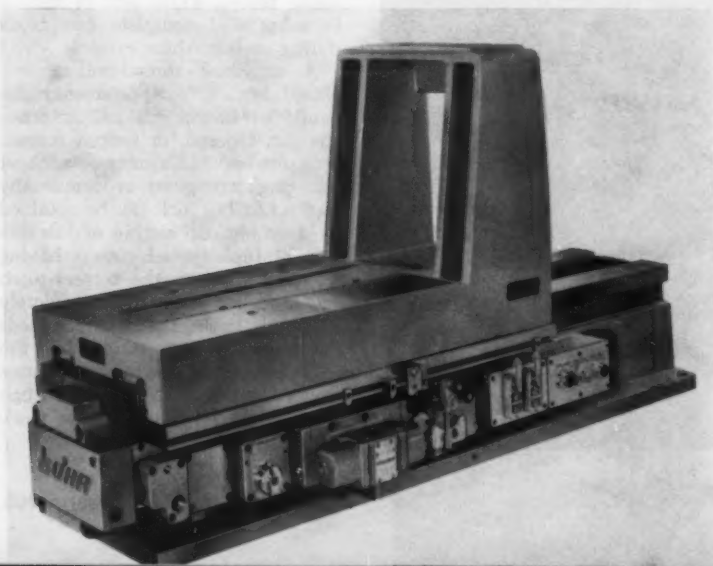


Fig. 1. Building-block feed unit offers unusual conversion adaptability

tural strength. The fact that only three hydraulic lines are required from tank to unit adds to the versatility and clean design of the equipment, which will be shown in integral motor bracket (Fig. 1) and flat platen styles (Fig. 2).

The units have box construction, are equipped with readily removable cartridge type main hydraulic cylinder, have hydraulic valve and manifold components common and interchangeable with all size units, built-in check-valves to eliminate surges, and manifolded lubrication to the detachable hardened and ground ways, eliminating flex lines. A differential circuit reduces oil consumption 50 per cent, so that smaller volume pumps are practical. Panel-mounted controls, another unique development, increase the versatility and adaptability of the way type feed units.

These special machine tool standard units, basic to all types of multiple-operation machine tools, introduce a new level of conversion-adaptability to users and potential users. The ready access to tooling and uncluttered exterior will be instantly noticeable in comparison with conventional units.

Circle 642 on Readers' Service Card

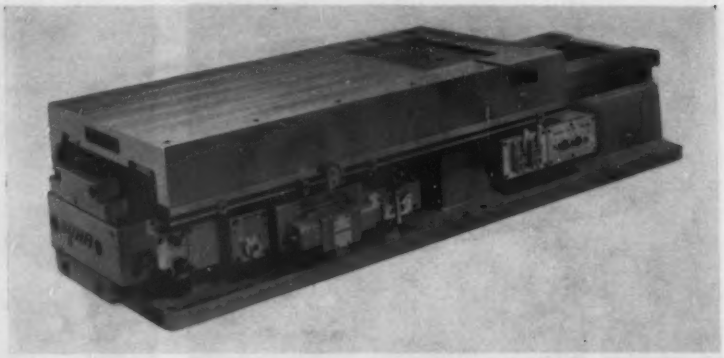


Fig. 2. Angle-based transfer machine feed unit has complete electrical wiring, hydraulic circuitry, and precision feed stops

Sundstrand Milling, Threading, Broaching, and Grinding Machines

Booth 1014

A twenty-unit automatic tool changer is a feature of a numerically controlled rail type machine, Fig. 1, to be exhibited by the Sundstrand Corporation, Rockford, Ill. The numerical control system covers a three-axis range of 60 inches of table travel, 40 inches of cross-rail travel, and 24 inches of vertical head travel. It provides continuous automatic cycles, including positioning and feed, speed, and tool selection.

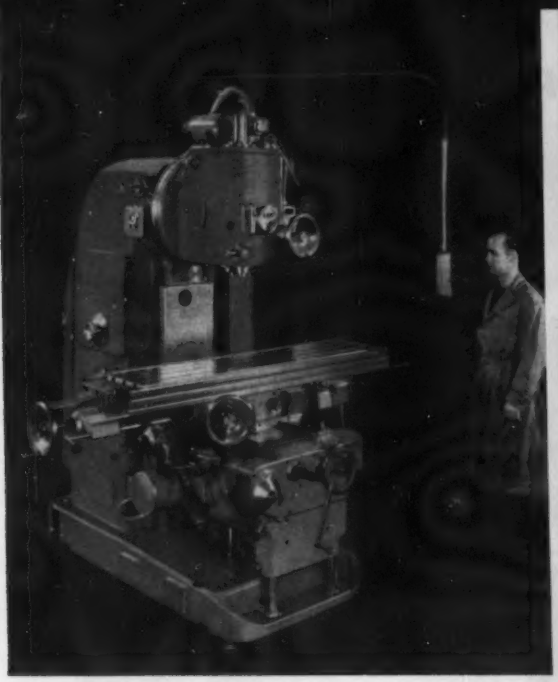
Fig. 1. Vertical spindle, three-axis numerically controlled machine

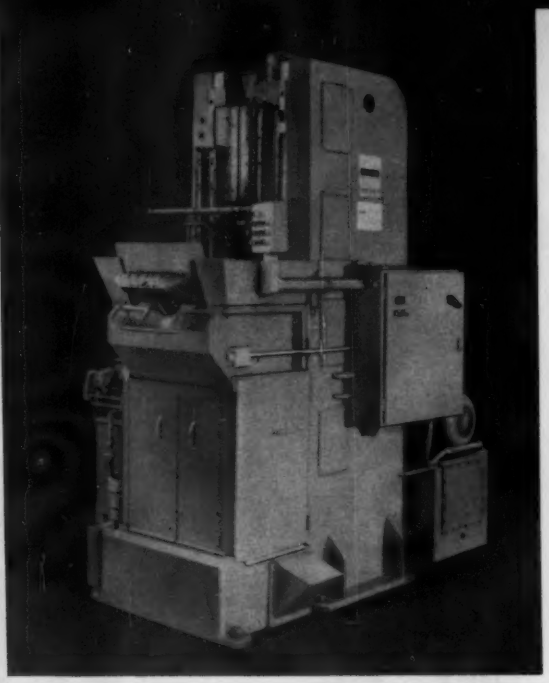
Standard control components permit manual operation of the equipment.

The new 15-hp knee type milling machine, Fig. 2, has a swiveling head for angular cuts, and a power quill for boring and drilling operations square with the face of the angular cuts. Pendant control of spindle rotation and feed and traverse of all slides; backlash eliminator for climb milling; and automatic tripping at the end of all power movements are other features of the machine. Speeds range from 20 to 1600 rpm; and feeds, from 1/2 to 90 ipm (longitudinal and cross) and from 1/4 to 45 ipm (vertical).

The building-block principle has been incorporated in the design of the three-way vertical broaching machine, Fig. 3. Interchangeable standard components make it possible to readily convert the equipment from surface broaching to pull or push broaching. A 15-ton, 42-inch (maximum) stroke machine, with a speed of 16 to 30 fpm, will be on exhibit. It will be equipped with a 45-degree automatic sliding table with three sets of fixtures for holding steel stator blocks. Three sets of surface broaches will complete one block during each machine cycle.

A universal thread-milling machine, Fig. 4, can produce right-hand, left-hand, external, internal, straight, tapered, or special threads by sine-bar adjustment, without changing any gears or cams. Any lead up to 1/2 inch can be obtained by a simple dial setting of the sine bar. Multiple-thread cutters having no lead, but with the correct pitch and form, are used. In a completely automatic cycle, the machine feeds the cutter to depth, and while the work revolves slowly, the cutter moves lengthwise. A facing unit can be attached for squaring the work to the thread.

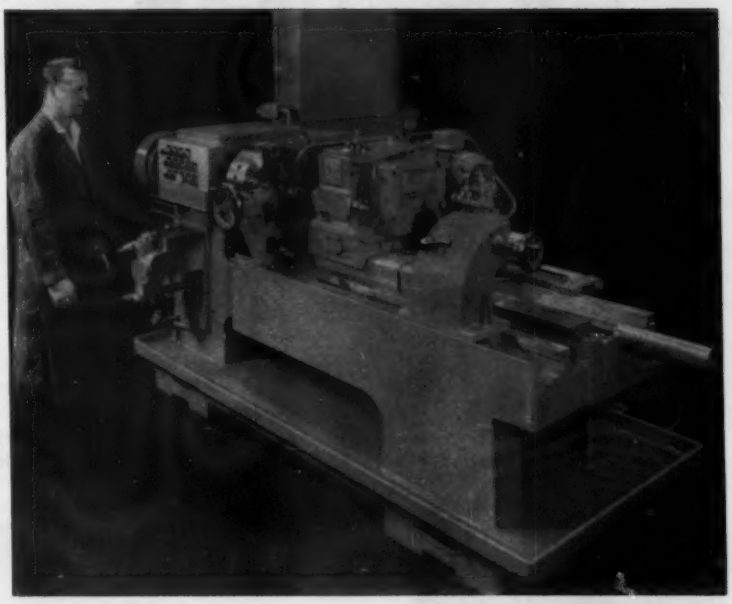




Sundstrand's new rotary surface grinder, Fig. 5, will be shown finishing clutch plates. It has a horizontal spindle and a reciprocating table carrying a rotating magnetic clutch. A 15-hp motor drives the wheel-spindle through V-belts. The spindle head can be fed manually or hydraulically. An automatic grinding cycle with rapid approach, feed, dwell, and return is also provided.

Other highlights in the Sundstrand booth will be: a multiple-tool production lathe having a vertical turning carriage and facing slide; a multiple-cycle tracing lathe on which three roughing cuts and one finishing cut are taken automatically under the control of the same template; a precision, multiple-spindle drilling, boring, reaming, and tapping machine; and a bed type milling machine with an all-angle head.

Circle 643 on Readers' Service Card



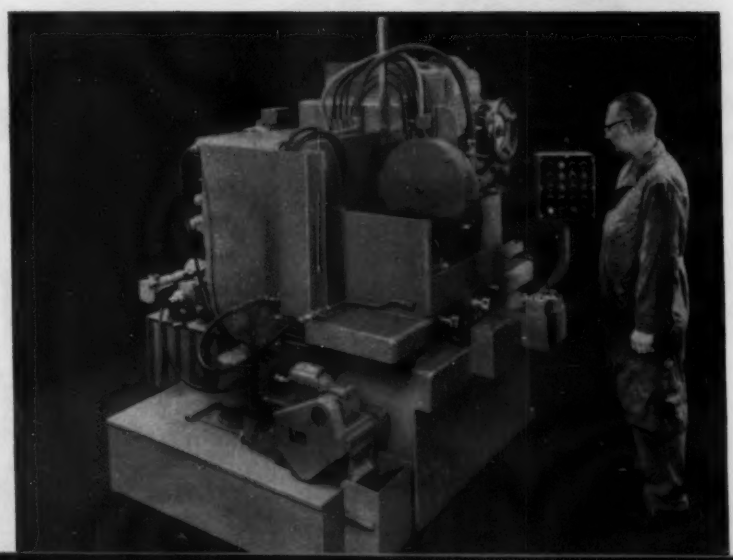


Fig. 2. (Top left) Model 30 vertical knee type milling machine

Fig. 3. (Top right) Three-way Sundstrand-American broaching machine

Fig. 4. (Center) Universal thread-milling machine equipped with sine-bar adjustment

Fig. 5. (Right) Sundstrand-Arter Model E rotary surface grinder

Centerless lapping machine to be shown by Size Control Co. Special rolls for lapping carbides are available

Size Control Co. Displays Lapping Machine

Booth 1120

Size Control Co., Chicago, Ill., will exhibit a redesigned line of centerless lapping machines. Among the new features of the machines are adjustable rolls, an easily accessible belt tightener, and a central oiling system (optional equipment). Adjustment of the rolls can be made by simply turning a crank which actuates a screw attached to the roll-bearing blocks. The mechanism is self-locking to assure proper positioning of the lapping rolls for large or small parts. V-belt driven rolls are employed to prevent vibration, and special rolls are available for lapping carbides.

Circle 644 on Readers' Service Card

Welded Steel and Meehanite Frame Materials Added to L & J Punch Press Lines

Booth 1116

The trend predominant in press manufacture is variation in materials of frame construction. In its exhibit, the L & J Press Corporation, Elkhart, Ind., features two of its new presses with welded steel construction, and

Fig. 1. Welded steel frame construction and a box slide assure optimum die life in L & J No. 125 OBI press

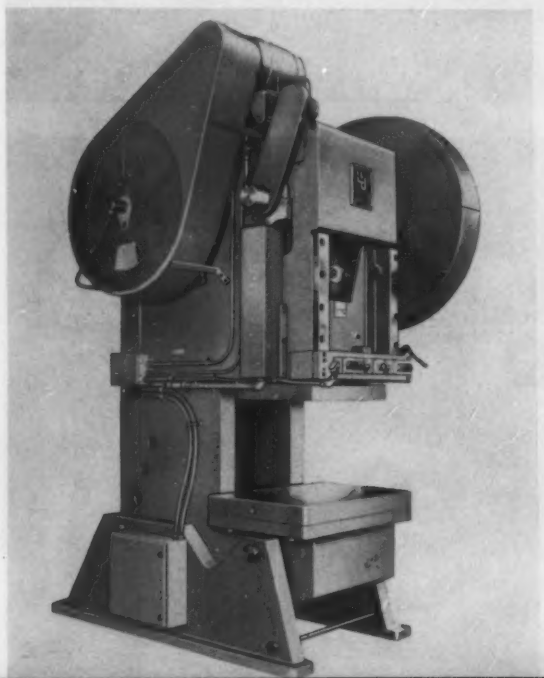
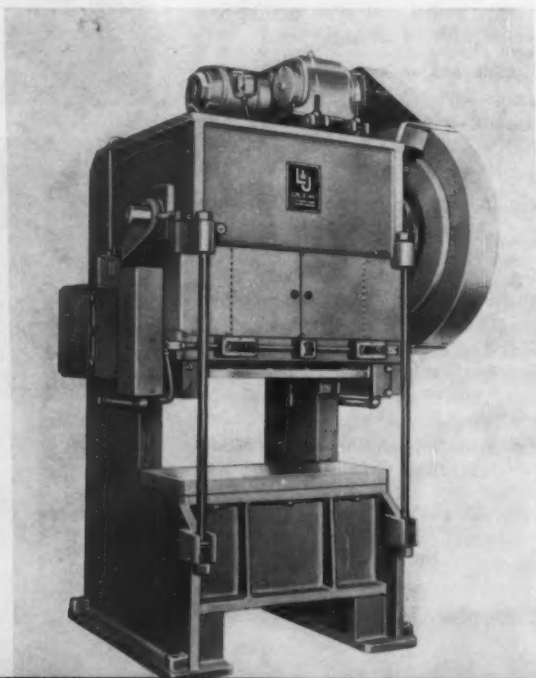


Fig. 2. Multiple-station dies and roll feeds will demonstrate adaptability of G75-2-48 gap frame press



in another new model, the company emphasizes Grade A Meehanite. For example, Model 90 uses Grade A Meehanite to get the strength needed for the greater throat depth and bolster area. A balanced design is achieved through the use of a crankshaft, pitman, slide, and associated parts, all having heavy-duty design. An air clutch is standard equipment on this press.

On the other hand, L & J No. 125 OBI press, Fig. 1, has a welded steel construction, heavily reinforced for maximum strength and resistance to deflection. This press has not been shown previously. To add to its capacity for precise stamping, it has a box slide and twin air counterbalances. Its air clutch is on the back shaft. The machine will accept dies as large as 42 by 29 inches and has a 19-inch shut height. Another example of the same construction is Model G-75-2-48 gap frame press, Fig. 2, which, in addition to its frame, also has a slide of heavy, welded construction. This machine will be in action at the Exhibition, tooled with an eight-station transfer and roll feeds.

Fig. 3. Complete redesigning of the 27-ton OBI press has made it faster and more rigid

The company will also show redesigned 27-ton OBI press, Fig. 3. Improvements in design and construction give this machine the added rigidity to work at higher speeds.

Circle 645 on Readers' Service Card

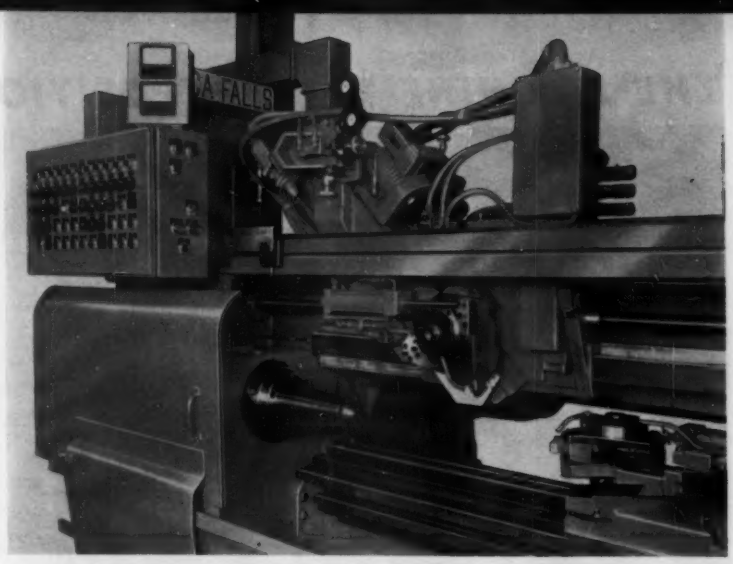


Fig. 1. Seneca Falls automatic tracer lathe equipped with a rear tracer carriage mounting an automatically indexed tool-block

Seneca Falls to Show Turning and Centering Techniques

Booth 231

Seneca Falls Machine Co., Seneca Falls, N. Y., will demonstrate new and interesting approaches to the problem of turning and centering on a production basis. A Model LQ automatic tracer lathe, Fig. 1, will be machining front wheel spindles. This machine is equipped with a rear tracer carriage mounting an automatically indexed tool-block, a left-hand overhead tracer carriage, and a front squaring attachment carrying a thread-rolling tool.

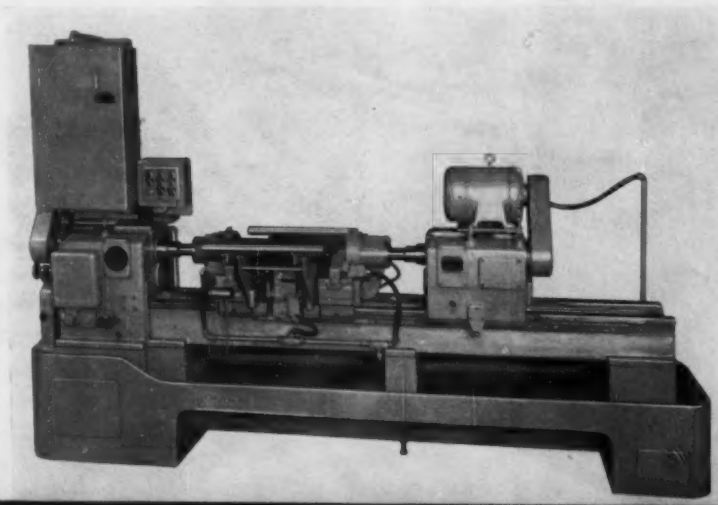
A second Model LQ automatic tracer lathe will be set up to demonstrate its flexibility of operation and rapidity of change-over. It is equipped with a servocontrolled overhead carriage operating from a template in the finish pass; an indexing tool-block; a two-axis, servocontrolled carriage on the rear bed; a multiple-speed headstock; and dual-rate mechanical feed. The magnitude of movements, sequencing, and selection of speeds and feeds are numerically controlled. A completely new read-out system will be shown for the first time and used in conjunction with the operation of this machine.

Two Model CS automatic drilling and centering machines will also be in operation. One is a hand-loaded machine that will be centering the shafts being turned, faced, and chamfered on one of the tracer lathes. The other, Fig. 2, will be fitted with a walking beam type loader and special vises, equipping it for completely automatic operation.

Various sizes and types of automatic work-drivers will also be displayed.

Circle 646 on Readers' Service Card

Fig. 2. Automatic drilling and centering machine equipped with walking beam type loader and special vises



THE MACHINE TOOL EXPOSITION—1960

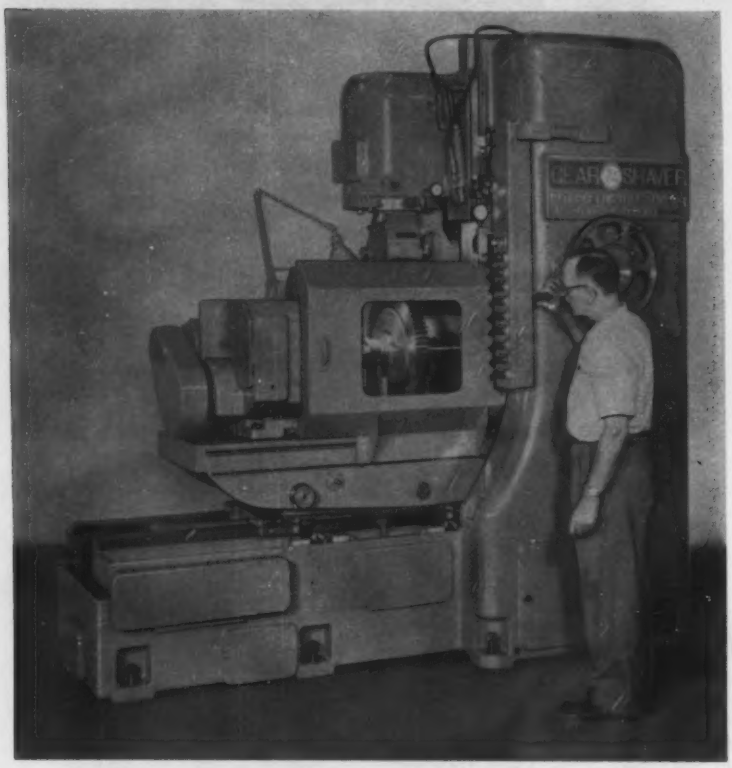


Fig. 1. Ease of loading and unloading speeds work and makes the GCX rotary gear shaver safer for operators

National Broach Shows Red Ring Gear-Making Machines

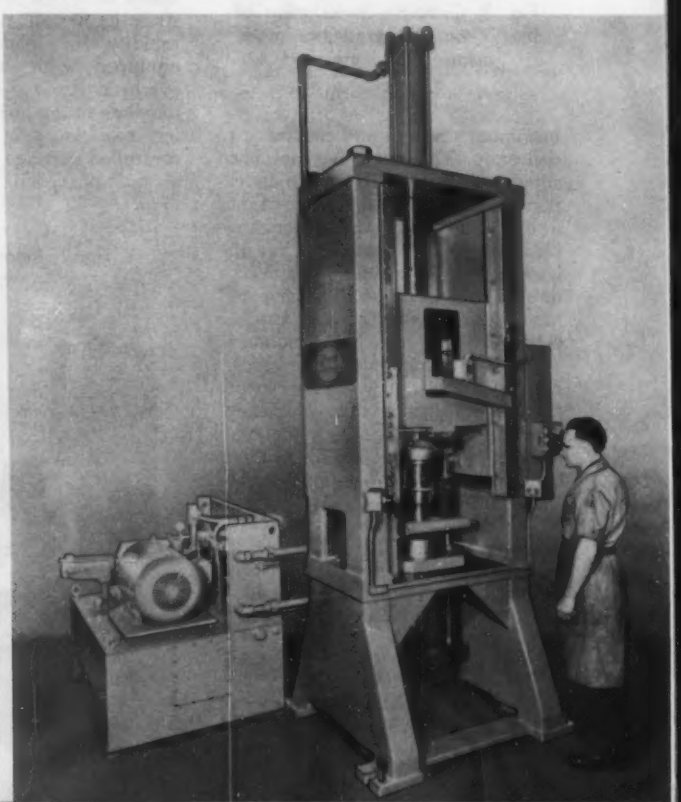
Booth 1430

A group of six Red Ring machines, not previously exhibited, will be the center of attraction in the display of the National Broach & Machine Co., Detroit, Mich. Model GCX 24-inch rotary gear shaver, Fig. 1, features a tunnel type column combined with an extended base. A deep work-table moves out from shaving position under the shaving cutter to permit unhampered loading and unloading of the work. Constructed entirely of cast iron, the machine has no knee. The cutter feeds down for shaving and is provided with rapid-traverse up-and-down feed.

The work drives the cutter, which is above the work, so that chips fall away from the cutting area. An automatic up-and-down feed is optional equipment. The shaver handles work from 3- to 24-inch pitch diameter in the 2- to 16-diametral pitch range. A maximum of 36 1/2 inches between centers is provided on the work-table. The table has a 10-inch stroke without crowning. When the crowning feature is included in the machine, an 8-inch stroke can be had.

Fig. 2. Helical pinion hone has automatic work loader. The machine's controls select four different honing methods

Fig. 3. Helical and spur gears can be broached with one tool pass using the Red Ring pot type broaching machine



An improved version of Model GHD 12-inch gear-tooth honing machine, Fig. 2, announced earlier this year, will be demonstrated, equipped with an automatic loader for honing small helical pinions. This machine has the work mounted on its bore and faces. The honing tool is on a slide behind the work-table, and it drives the work gear in both directions of rotation while the honing head reciprocates.

Four separate methods of honing hardened gears are provided: honing with backlash in conjunction with a patented locked honing head; zero-backlash operation with precision pressure control in conjunction with the patented honing lock; constant-pressure operation with a unique automatic, mechanical, wedge type backup eliminator; and constant-pressure operation with overload relief provided by an adjustable-leaf, spring backup protector.

Taking its basic design from a vertical hydraulic press, Red Ring pot type broaching machine, Fig. 3, is patented after a vertical hydraulic press. The equipment produces spur gears, helical gears, and other toothed forms on the outside diameter of a part. The tooth form is cut by a unique, one-piece broaching tool resembling an internal gear. The machine on display will be producing the external helical gear teeth on a 4-inch outside diameter cast-iron blank in a single five-second pass of the broaching tool.

Also in the booth will be an economy gear-sound analyzing combination for short-run and semimass-production plants. This is a conventional Red Ring Model GSC 10-inch gear speeder (Fig. 4) equipped with a microphone, broad-band amplifier, and a meter in place of the usual horn unit, arranged to simplify and standardize the checking of production gears for sound characteristics. The unit reduces inspector inconsistencies.

Circle 647 on Readers' Service Card

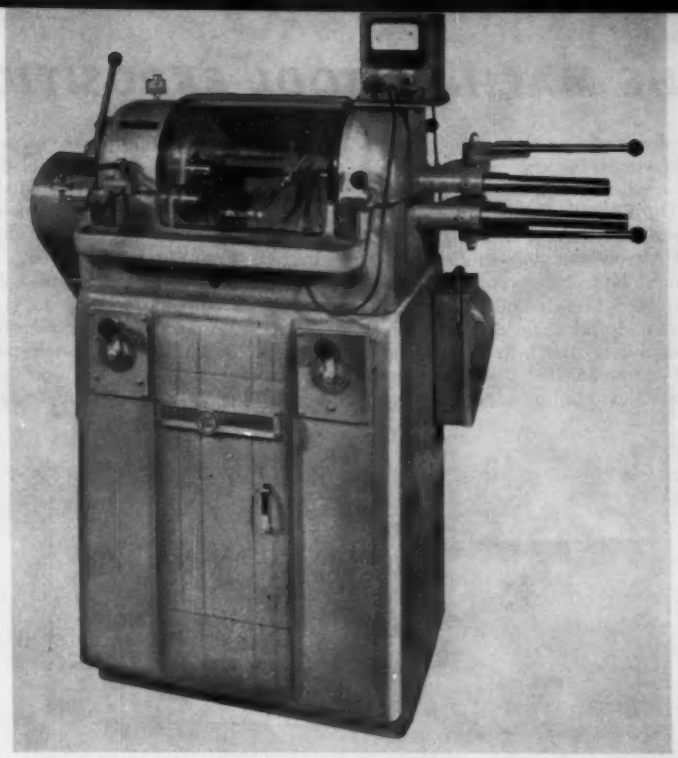


Fig. 4. The noise made by mated gears can be read-out visually using the Red Ring speeder with broad-band amplifier

Michigan Tool Universal Shaving Machine, Gear Shaper, and Gear Grinder

Booth 945

Michigan Tool Co., Detroit, Mich., will introduce a Model 870-A Mark II universal shaving machine, a Model 3053 feed-through Shear-Speed gear shaper, and a crown gear grinder at the Exposition. Also on display will be a Series 482-A deburring and chamfering machine for spur and helical gears. All equipment will be in operation.

The Shear-Speed gear shaper has been built to meet the needs of automation lines. It has an open-back, two-column design that permits through feed and reduces cycle time. The deburring and chamfering machines to be shown operate on semi-automatic cycles. Two reinforced grinding wheels, powered by air turbines, are counter-balanced to follow the edge contours of both tooth faces simultaneously. The gear-reducer cycle can be preset to drive the gear being finished through the proper number of rotations in order to achieve the required degree of chamfer. A feature of the new gear-shaving machine is that it can be set

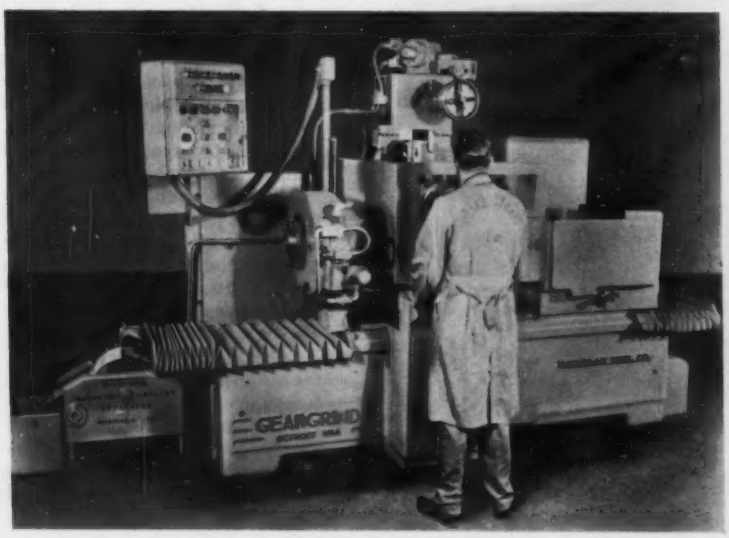


Fig. 1. Crowning gear grinder which incorporates wheel-dressing and rough- and finish-grinding operations in an automatic cycle

up for underpass, modified underpass, or transverse shaving. It is automatically loaded and unloaded.

The Gear Grinding Machines Division will show a Model CGG 16x 18FA crowning gear grinder (Fig. 1) which is fully automatic, including the wheel-dressing cycle. After a rough-grind cycle of this machine is complete, the gear is automatically semifinished and/or finish ground, with all grinding rates being preset. A Model 999 abrasive hard-gear finisher (Fig. 2), a Model 607 gear-rolling checker, and a Model 1537 Roto-Flo machine with an unusual setup will also be demonstrated. Roto-Flo machine, Fig. 3, will be shown in operation cold-rolling a thread and a tapered serration on an automotive steering-gear sector shaft with a single pass of the rack slides.

Circle 648 on Readers' Service Card

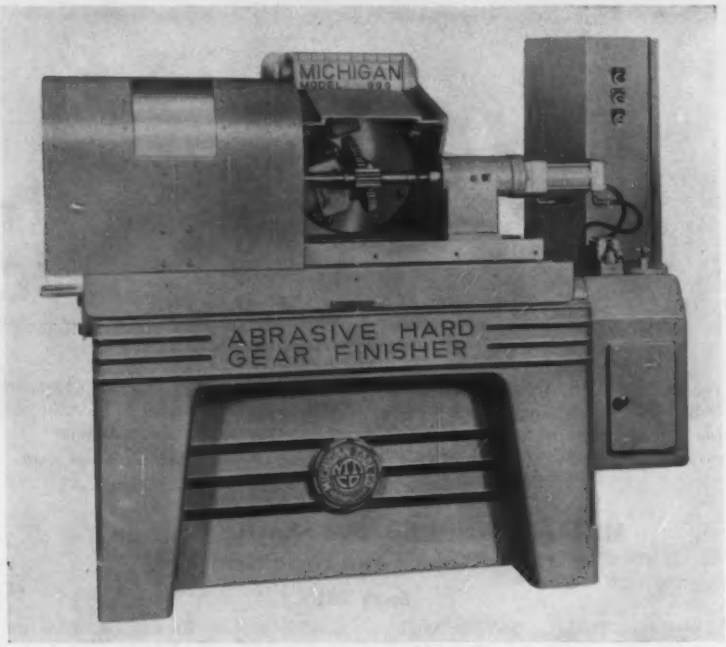


Fig. 2. Model 999 abrasive hard-gear finisher built by Michigan Tool Co.

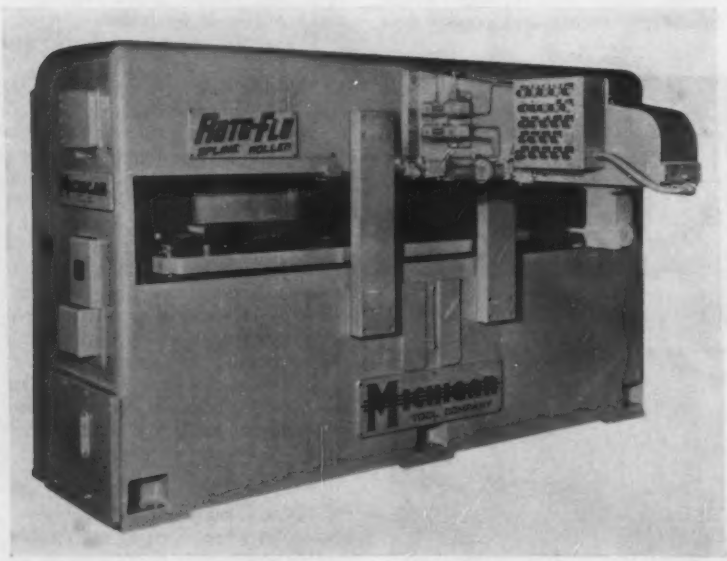
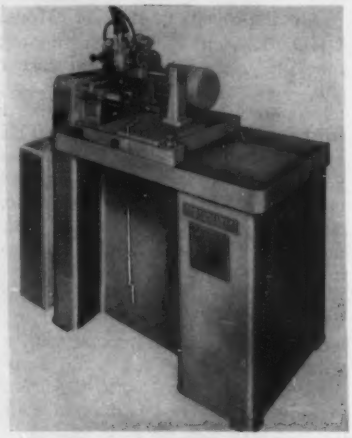


Fig. 3. Roto-Flo machine for cold-rolling of toothed forms



American-built microstoning machine makes centerless plunge cuts, achieves 2-micro-inch finish

Taft-Peirce Centerless Microstoning

Booth 1426

A centerless, plunge-cut microstoning machine tool principle designed for high-production finishing of small parts, will be introduced at the Exposition by Taft-Peirce Mfg. Co., Woonsocket, R. I. Up to now, microstoning, as shown last year, has been an attachment for machine tools. Designated Taft-Peirce Supfina No. 86, the new self-contained microstoning machines operate under a fully automatic work cycle. The patented microstone operation finishes the outside diameters of all types of small parts which require an unusually fine micro-inch finish, precise form accuracy, and sound surface structure.

The equipment works by turning parts between two rotating rolls where they are kept in contact with a rapidly oscillating abrasive stone, as differentiated from the concepts of honing or lapping. The cut removes the amorphous surface layer left by the cutting pressures and temperatures of previous machining operations; and it also corrects errors such as out-of-roundness, chatter marks, and feed spirals. Depending on the work-piece material, its hardness, and initial degree of roughness, surface finishes down to 1 micro-inch are generated with simultaneous out-of-roundness correction of 75 per cent or better. The microstoning head moves at frequencies of 2000 to 3200 cycles a minute, and its vibration amplitude is infinitely

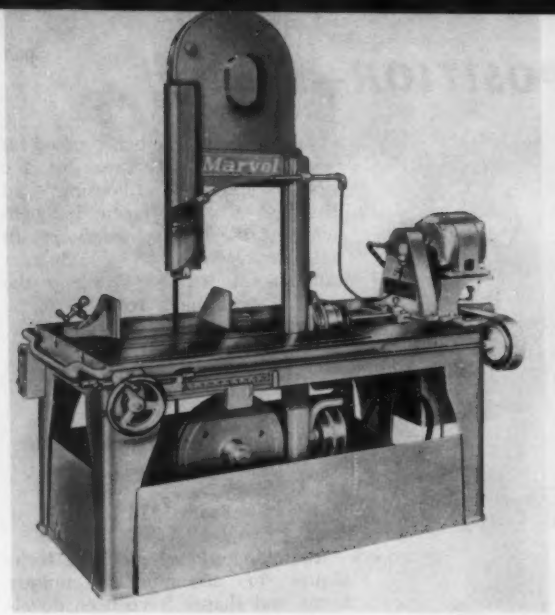


Fig. 1. Marvel all-hydraulic band saw

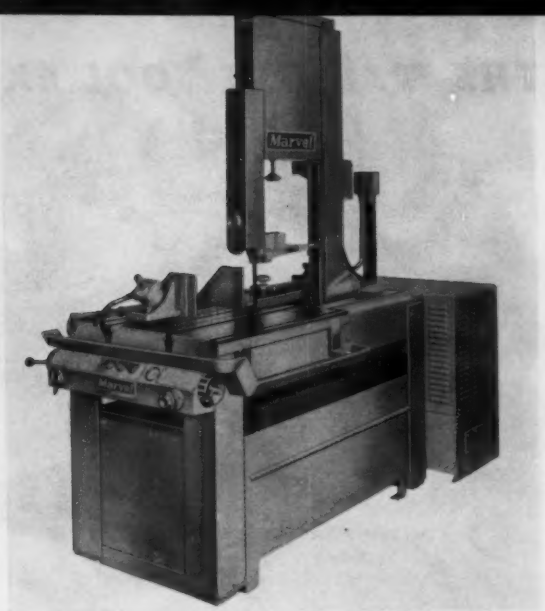


Fig. 2. Mechanical band saw feeds blade to work

adjustable from 0.080 to 0.200 inch.

Illustrated is the plunge-cut version, with automatic cycling, on which outside work surfaces up to 2 inches long by 1/8 inch to 1 1/8 inches in diameter can be finished. The other version of the machine (not shown) to be exhibited is a "through-feed" model which automatically passes work-pieces under a series of fine abrading stones.

The company will have two of its No. 1 precision surface grinders in the exhibit. One will be set up to demonstrate precise form grinding. It will be equipped with a Diaform wheel dresser and a variable-speed control for the wheel-spindle. Several refinements have been added to these machines recently, such as the cross-feed mechanism's new spring-loaded antibacklash assembly, which assures constantly precise settings; an improved control knob for the vertical feed vernier; and specially plated handwheels for easier reading of the scales.

Another machine tool offering new features is the company's 24-inch, semi-automatic lapping machine. This device now has a unique mounting, which allows dishing the plate as much as 0.030 inch to compensate for normal wear, or to achieve greatly improved results on certain types of lapping jobs. The lapping plate is reversible, a feature which assures longer life. The abrasive compound tank system has improvements, such as a separate drive motor; constant agitation, even when the machine is not running; and micrometer screw valve for flow regulation. The removable tank is completely self-contained so that changes in compound can be made in seconds if spares are available.

Armstrong-Blum Band Saws and Hack Saws

Booth 1340

Billed as the "world's biggest sawing demonstration," fourteen Marvel machines of the Armstrong-Blum Mfg. Co., Chicago, Ill., will be busy cutting up tons of steel. Two band saws and three hack saws are illustrated here. The No. 81 band saw, Fig. 1, is an all-hydraulic, high-speed, heavy-duty machine. A Sure-Line control continuously senses and automatically corrects any tendency of the blade to cut inaccurately. Column and blade tilt up to 45 degrees both sides of vertical for mitering. Speeds range from 55 to 340 fpm, and feeds, from 0 to 200 pounds. Stock capacity is 18 by 20 inches.

The No. 8 band saw, Fig. 2, is an 18- by 18-inch capacity mechanical machine designed for universal usage. Its blade is fed into the work, which is held stationary on the table. Change from power feed to hand feed is instantaneous.

Fig. 3 shows a No. 4B hack saw having a 6- by 6-inch capacity (long stroke) or a 6- by 8-inch capacity (short stroke). Designed for the small shop or warehouse, it is avail-

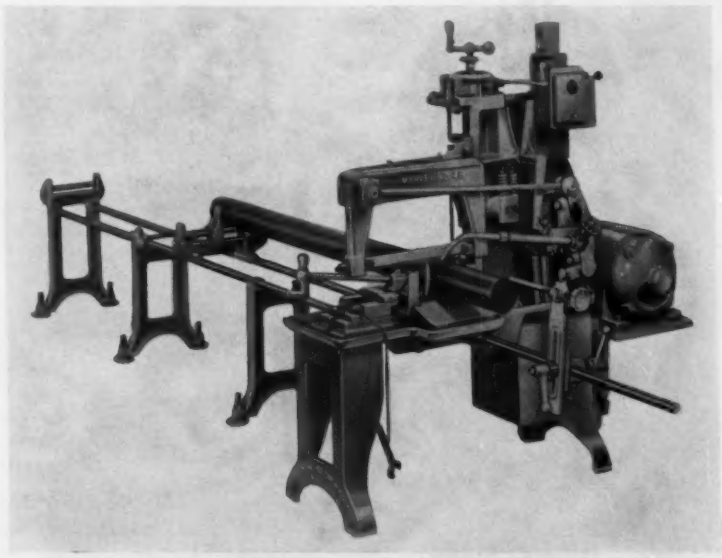


Fig. 3. Universal hack saw for small shops

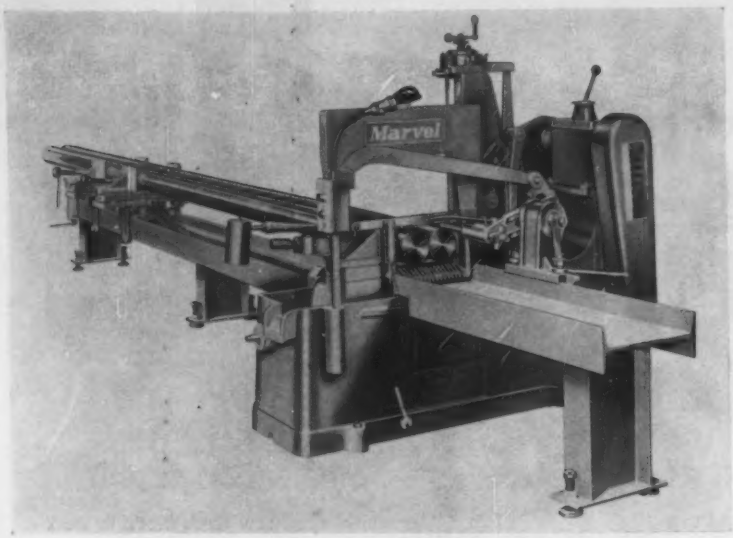


Fig. 4. Marvel hack saw with automatic bar feed

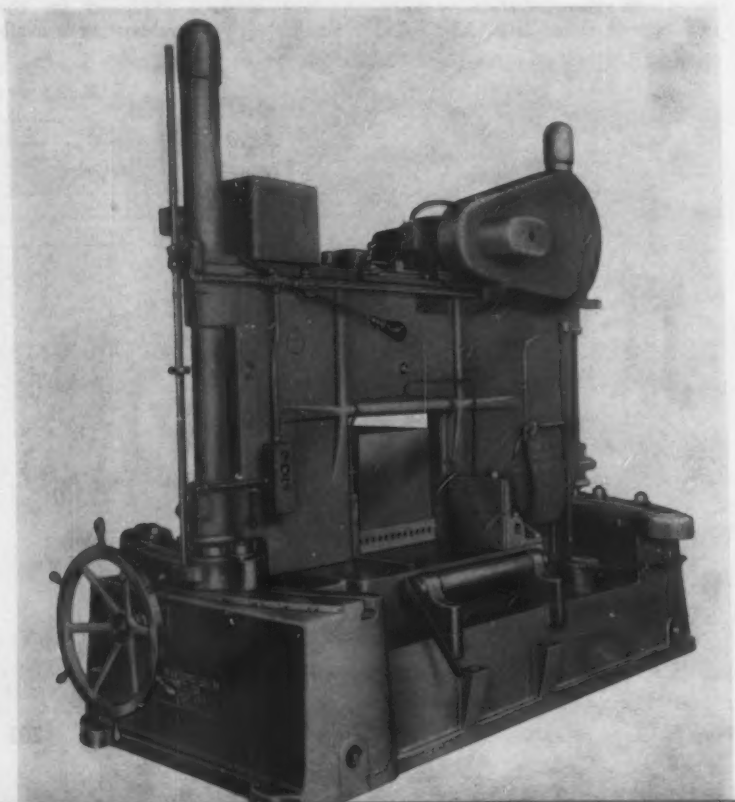
able with either open legs or a cabinet base, with one, two, or four speeds. A built-in coolant pump and sump requires no belts or gears.

Speed, accuracy, and low-blade cost per cut are claimed for the automatic bar feed hack saw in Fig. 4. A unique dual feed and crank lever reciprocation of the blade frame provides fast cutting at normal blade speeds. Construction is both rugged and accurate, with ball or roller bearings used at all load-carrying points. Two models are available: No. 6A4, with a capacity of 6 by 6 inches; and No. 9A4, with a capacity of 10 by 10 inches.

No. 24 (24- by 24-inch capacity) hack saw, Fig. 5, is said to be the largest such machine made. Features include a low-pressure hydraulic system with the pump operating only when the housing is being raised for reloading; total enclosure of the blade frame in the housing; and lifting of the saw frame independently of the housing on the return relief stroke. Angles up to 45 degrees can be cut without swinging the work. Speed ranges from 20 to 80 strokes per minute.

Circle 650 on Readers' Service Card

Fig. 5. World's largest hack saw, for die blocks and structurals



Exhibition of Microhoning Machines

Booth 1225

Microhoning machines and techniques to accommodate unique forms and shapes have been developed to productive capacities by the Micromatic Hone Corporation, Detroit, Mich., during the last five years. Machines to be exhibited in the Micromatic booth are automated in varying degrees. Some models are equipped with modified transfer systems to illustrate the adaptability of Microhoning equipment.

A Model 2VB machine designed for honing truncated spherical surfaces after rough-machining is shown in Fig. 1. The machine achieves geometric accuracy within 0.0003 inch for sphericity and controlled surface finishes of 6 to 10 micro-inches, rms. A self-dressing abrasive cup removes 0.002 inch of stock from the Micromatic-machined sphere in twenty-four seconds. The abrasive casing is plastic, scored to break off without chipping the stone as it wears down. When Carbond abrasive is used, the stone life is about 400 pieces per spindle. This machine can be fully automated, either alone or in conjunction with Model 5VMB.

In Fig. 2 is shown the versatile "150" machine which is designed for precision processing at relatively low cost. Partial or complete automation of this model is made practical by the immediate availability of package units such as the automatic hydraulic feed and stone-wear compensation device (Microdial). Other optionals include any of several types of automatic sizing (Microsize) and an automatic coolant separator, pump, and tank.

Another exhibit will be the latest development in a basic vertical honing machine. The spindle-in-quill construction of this Model 5V16 (shown in Fig. 3) allows heavier stock removal than machines of comparable size. Because it is hydraulically actuated within the housing, the spindle-carrying quill reciprocates and the spindle rotates, thus

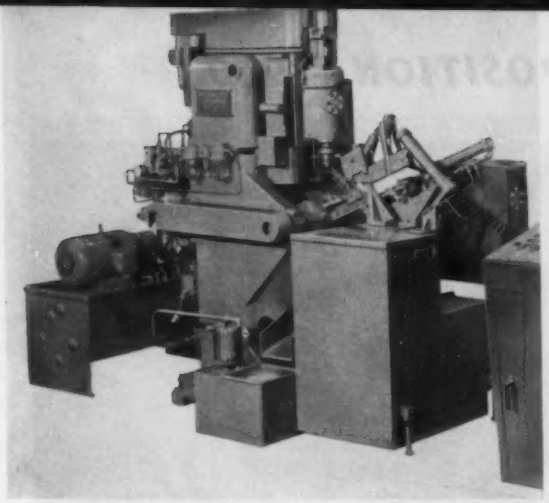


Fig. 1. Model 2VB machine for Microhoning truncated spherical surfaces after rough-machining

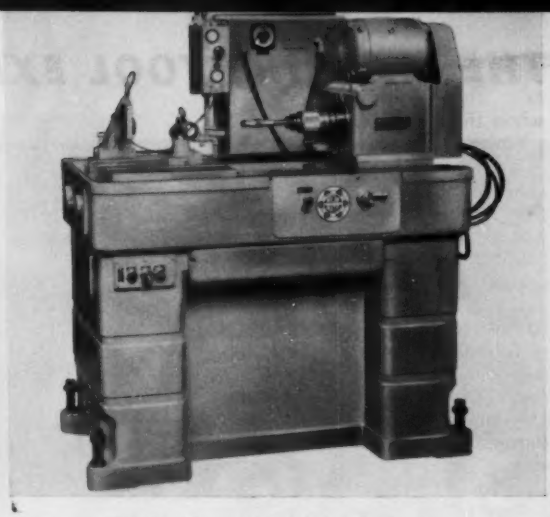


Fig. 2. (Above right) Versatile Hydrohoner which handles work up to 1 1/2 inches diameter, has 12-inch stroke

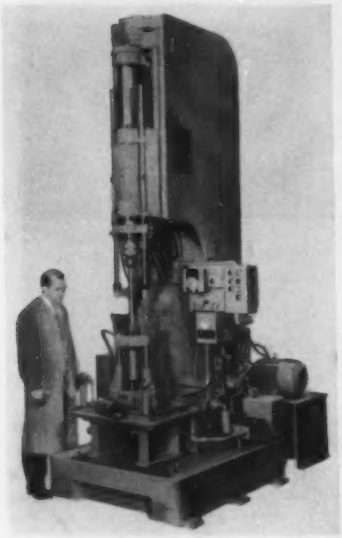


Fig. 3. (Above) Vertical honing machine designed for heavy stock removal on wide range of work

centralizing the torque along their common axis.

Since the spindle housing does not reciprocate, weight and the power requirement are reduced with no loss in efficiency. The deep-throated capacity of the machine permits the Microhoning of a wide range of work-part sizes. Any type of riser block or index-table, interlocked with machine controls for a fully automatic cycle, can be supplied with this model.

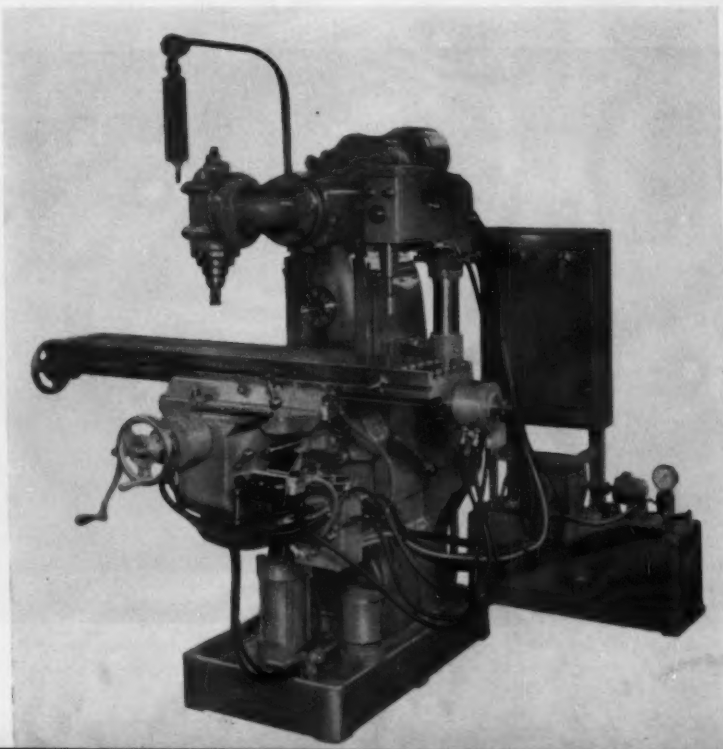
Other machines on exhibit will include Model 5VMB for rough-spherizing truncated spherical surfaces before Microhoning; Models 738-C and 2HRI-5 for Microhoning the functional inner surfaces of antifriction bearings; Model 5HX16 for Microhoning short bores of several parts simultaneously; and two models for finishing the bore and flat surfaces of automotive pinion gears. All of these machines will be illustrated in October MACHINERY.

Circle 651 on Readers' Service Card

Greaves Scan-O-Matic Milling Machine

Booth 1439

The Greaves Machine Tool Co., Cincinnati, Ohio, will display a new Scan-O-Matic milling machine which consists of a Model 2H heavy-duty milling machine equipped with automatic scanning tracer control. In this system, the tracing stylus automatically follows the contour of a master, regardless of the shape to be cut. The deflection of the stylus is always the same. Constant torque hydraulic motors provide the rotary power. Adjustable stops, operable from either the motion of the table saddle or the knee, trip the table-reversing valve at the end of each stroke. At the same time an indexing motor returns the work for a new cut. The knee is operated automatically in the vertical direction by a hydraulic cylinder. Since the reversing valve can be actuated from a vertical or a horizontal motion, the stops can be set to trip



Scan-O-Matic milling machine with automatic tracer system

when the tracer strikes the wall of a cavity or a core.

The tracer head has adjustable feed controls from 0 to 12 inches per minute, with a selector for either power feed to table or automatic tracing; a lever-operated hydraulic control panel for tracing; and a pick feed directional control. An electric control panel with off-on switch and electric timer determines the amount of feed from a few thousandths to several inches. Disconnecting fluid motor clutches permits normal operation of machine. Other Greaves milling machines will also be on display.

Circle 652 on Readers' Service Card

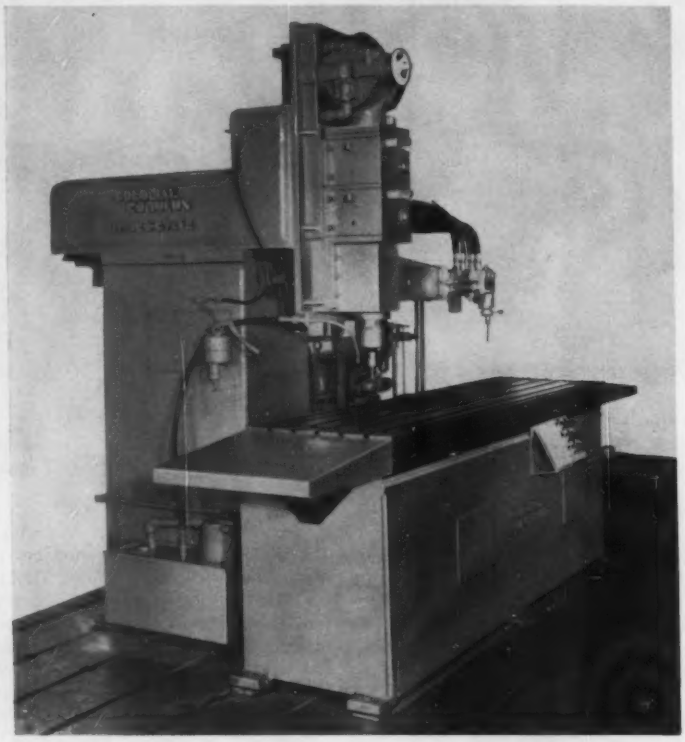


Fig. 1. Tracer-milling machine is hydraulic throughout, including a variable displacement spindle drive motor

Twin-Ram Pulldown Broach Sparks Colonial Exhibit

Booth 241

The outstanding feature of the live exhibit of Colonial Broach & Machine Co., Detroit, Mich., will be an innovation in broaching machines—a twin-ram pulldown type (Model RDT-6-42). In the past, the twin-ram principle—in which the rams travel in continuously opposed directions—has been applied primarily to surface broaching machines. Advantages of the process are high rate of output and ability to load one fixture on the machine while the other ram is cutting. The twin-ram model to be exhibited is a six-ton machine with a 42-inch stroke for each ram.

The new machine is designed to avoid lost time waiting for the return stroke of the ram and to eliminate the banking of parts between operations. It uses simple shuttle tables for unloading finished parts during the return stroke of each ram. It permits two-pass operation on the same part (such as roughing with one ram and finishing with the other), two separate operations on each ram, or internal broaching on one ram and surface broaching on the other.

In addition to broaching equipment, the company will exhibit its latest tracer-controlled Hydro-Cycle contour mill, Fig. 1. This milling machine is ideally suited to die-sinking work and contouring aircraft parts. A universal indexing table, providing positive indexing with complete freedom from backlash at all times, will be another feature of the Colonial exhibit. The table is designed not only for broaching but also for milling, boring, drilling, and other types of operations requiring high index precision.

Besides the broaching machines and tracer-operated contour-milling machine, the company will stage a working display of its Model FS-5-36 grinder, Fig. 2. The sharpening of flat broaches is the specific work of this machine. Basically, it has the base of a surface grinder with a ram carrying the head in such a way as to traverse the broach teeth. The head tilts to make the proper tooth geometry, and the table is arranged to index the pitch distance of the one tooth at the end of each wheel pass.

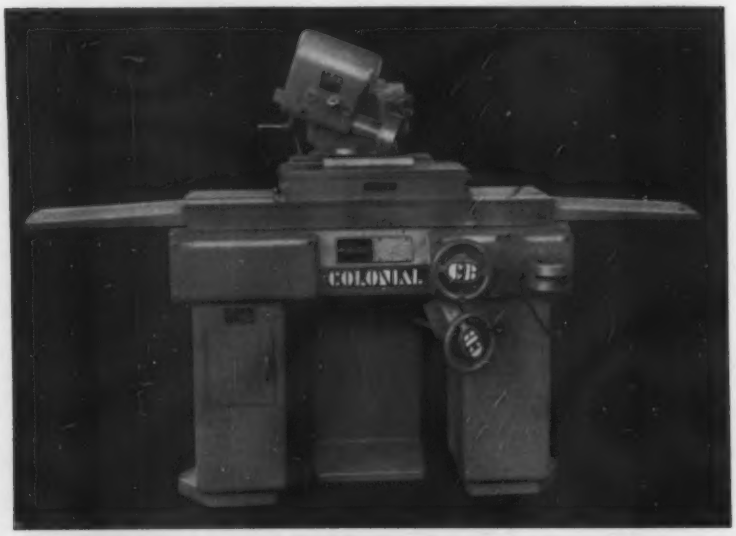
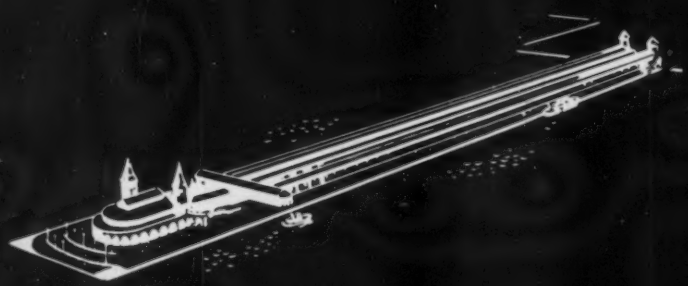


Fig. 2. Flat broach grinder sharpens teeth with high dimensional accuracy

Circle 653 on Readers' Service Card

NEW PRODUCTS AT THE
NAVY PIER

THE PRODUCTION ENGINEERING SHOW



Chicago, Illinois

September 6 to 16

New Products on Display

Jig borer controlled by Farrand Inductosyn system

Inductosyn Control System

Booth 103

A transistorized Inductosyn numerical control system for machine tools will be exhibited by Farrand Controls, Inc., New York City. Features of the system, it is claimed, are its relatively low cost, its ease of operation and maintenance, and its compactness. Application of the system to a jig borer will be seen at the Show. New metal positioning elements—sliders, scales, rotors, and stators—are said to be more accurate than those made of glass, because thermal expansion is the same as that of the machine tool.

An Inductosyn system applied to a rotary table for both tape and manual input will also be demonstrated. In addition, the Farrand exhibit will contain a new series of extremely accurate computer transformers designed for use with data elements.

Circle 654 on Readers' Service Card

Fig. 1. Norden linear display system shows actual tool or work position

Norden Modumatic Control Systems

Booth 221

One of the family of Modumatic control systems to be displayed by the Norden Division of United Aircraft Corporation, Gardena, Calif., is the Series 100 linear display system shown in Fig. 1. It provides read-out of actual cutting-tool or work-piece position. Using the Norden analog-to-digital shaft encoder, the system is absolute rather than incremental, thereby preventing loss of information during power interruptions. It has full-range electronic origin selection and built-in self-checking circuitry. The system has been designed for all types of machine tools used on small-lot production. Of special interest is the fact that it can be adapted to existing machine tools.

Another of the family is the Series 400 positioning system, Fig. 2. It provides manual, manual numeric, and punched-tape control of cutting-tool or work-piece position. Modular or building-block design allows the user to purchase the exact degree of control and the specific features he needs for a particular application. This system is available in two versions: a standard model for jig borers, lay-out tables, boring mills, and similar tools; a high-speed model for drilling tables and other applications where rapid positioning is of prime importance. Both feature full-range electronic origin selection and employ eight-channel A.I.A.-E.I.A. standard punched tape as an input medium.

The Series 600 positioning system, Fig. 3, provides manual, manual numeric, and punched tape control

at the Navy Pier

Fig. 2. Another of Norden's Modumatic control systems is this Series 400 system (standard or high speed) for positioning either cutting tool or work-piece

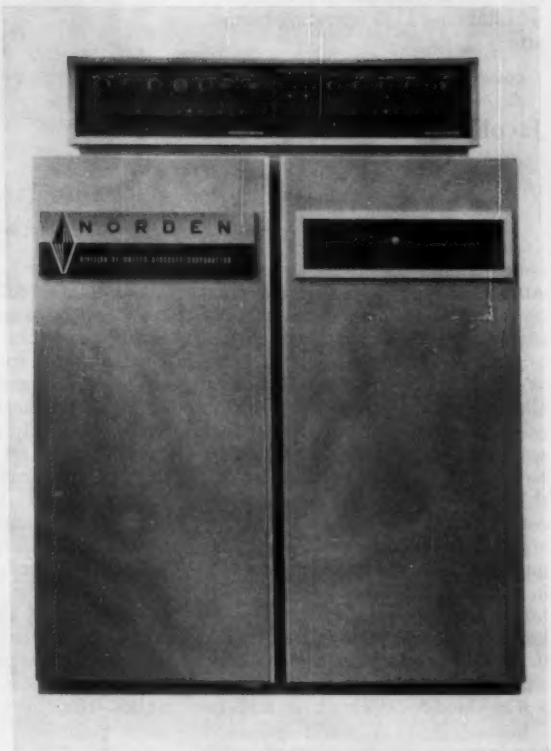


Fig. 3. Series 600 positioning system provides read-out of actual tool or part position. Operator or programming errors are indentified before machining

with read-out of actual cutting-tool or work-piece position. Operator or programming errors can be quickly identified before initiation of the machining cycle. This read-out feature, together with full-range origin selection, provide economical machining of small lots by eliminating both tape preparation and operator calculations. An eight-channel tape punch is available as an option. It provides a complete record of actual machining positions, greatly reducing inspection time.

Newest member of the Norden family of Modumatic control systems is a complete line of automatic inspection systems. Although standard models can handle most parts, modular construction permits tailoring the system to a particular application. Input can be manual, manual numeric, or from punched tape. Output can be provided as decimal display, print-out, or a standard eight-channel punched-tape record. The systems are absolute rather than incremental and provide actual dimensions, deviations from nominal values, or out-of-tolerance indications.

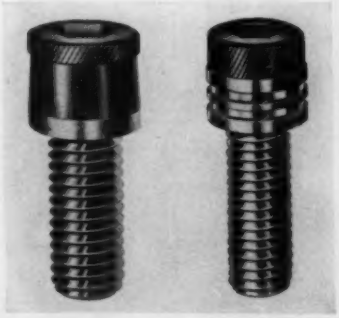
Circle 655 on Readers' Service Card

Blue Devil Cap-Screws for Vibration Applications

Booth 403

Included among the many types of Blue Devil socket-head screws and fastening accessories to be displayed by the Safety Socket Screw Co., Chicago, Ill., will be two cap-screws designed for use where vibration and leakage are a problem. Led-Lok cap-screws, left, are not only effective for uses involving standard vibration problems, but also provide a seal against gas, oil, and water. When torque is applied to seat the screw, a Led-Lok washer is extruded into a cavity formed by back taper on the screw head.

Saf-Lok cap-screws, right, are engineered for use in assemblies where severe vibrations requiring a



Led-Lok (left) and Saf-Lok (right) cap-screws designed for applications involving vibration and leakage

higher torque are present. As the screw is drawn down into position a special grooved insert (brass, bronze, aluminum, or stainless steel) collapses, filling the counterbored hole and creating a two-fold locking action. This locking action is capable of withstanding high operating temperatures.

Circle 656 on Readers' Service Card

Jacobs Handwheel-Operated Collet Chuck

Booth 113

A Model 50 handwheel-operated collet chuck designed expressly for Atlas-Clausing, Delta, Logan, Sheldon, South Bend, and other lathes of similar size and power will be exhibited by the Jacobs Mfg. Co., West Hartford, Conn. The new chuck, Fig. 1, and its collets can be used in place of the conventional split steel collets and draw-bar attachments regularly employed on these lathes. Each of the Series 500 collets used with the Model 50 chuck has a checking range of 0.100 inch and will hold any diameter bar in its range, whereas each conventional split steel collet has a very limited capacity range (0.003 to 0.004 inch) and is designed to chuck only one size of bar.

The Model 50 chuck is said to allow tighter collet closing on the bar than is possible with draw-in tube type chucks. It can be mounted on the lathe spindle nose and is easily opened and closed by means of its handwheel. Collets can be changed quickly in the new chuck. Because it has no draw tube passing through the headstock spindle, the chuck's capacity has been increased 42 per cent. Runout accuracy at the nose is held to a true indicator reading of 0.001 inch.

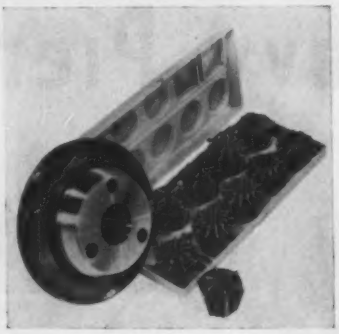


Fig. 1. Model 50 collet chuck and set of Rubber-Flex collets

The complete set of ten J-500 series collets is packaged in a compact molded plastic box. These collets cover a range of 0.093 inch to 1.063 inches, or 3/32 inch to 1 1/16 inches. The chuck is supplied ready for mounting on the threaded lathe spindle. Adapters are fully machined and are attached to the chuck at the factory before shipment.

Other Jacobs products to be exhibited include: a ball-bearing super chuck for heavy-duty drilling, specially designed for accuracy, gripping power, and ruggedness; the Albrecht heavy-duty drill chuck, a keyless, self-tightening chuck of exacting accuracy distributed by Jacobs in the United States and Canada; a lightweight Rubber-Flex tap chuck designed to handle the entire range of tap sizes from No. 0 to 5/8 inch; and the Model 91 lathe chuck with Rubber-Flex collets.

Circle 657 on Readers' Service Card

Louis Allis Exhibits Drives and Motors

Booth 127

Louis Allis Co., Milwaukee, Wis., will have a Select-A-Spede transistorized, direct-current adjustable speed drive among the new drives and motors the company will display. This drive, which permits transistor control of machines requiring adjustable speed, is shown in Fig. 1. Based on the Ward-Leonard principle of converting alternating-current power to adjustable voltage, direct-current power, it provides a

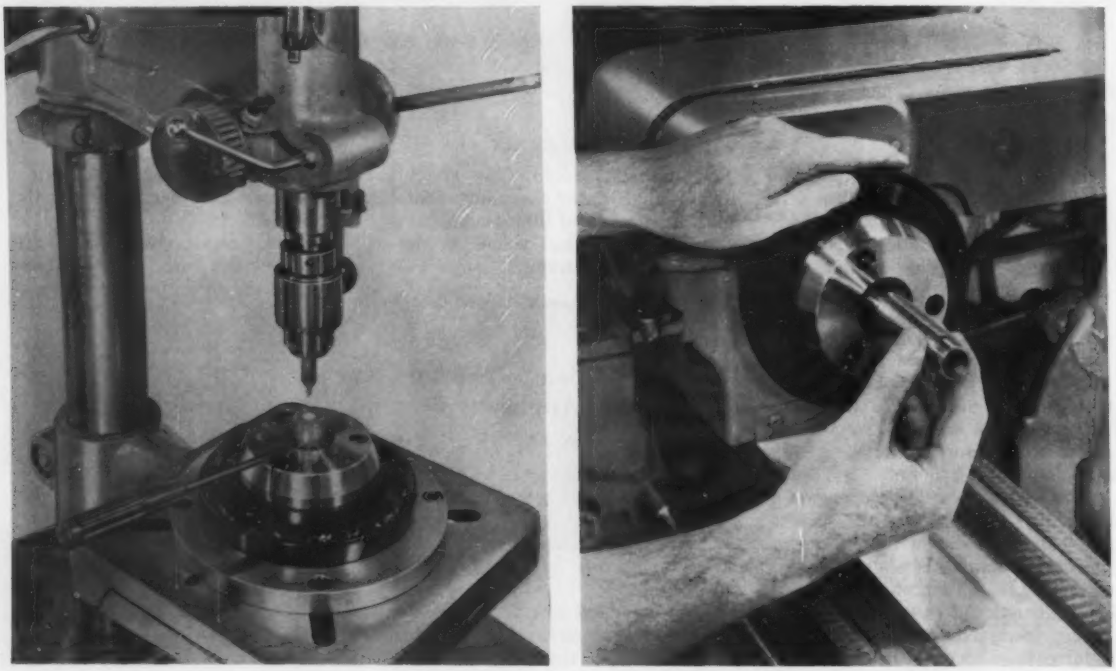


Fig. 2. (Left) Jacobs Model 50 chuck used as work-holding fixture on a drill press, (Right) Lathe work is gripped quickly and easily by this handwheel-operated chuck

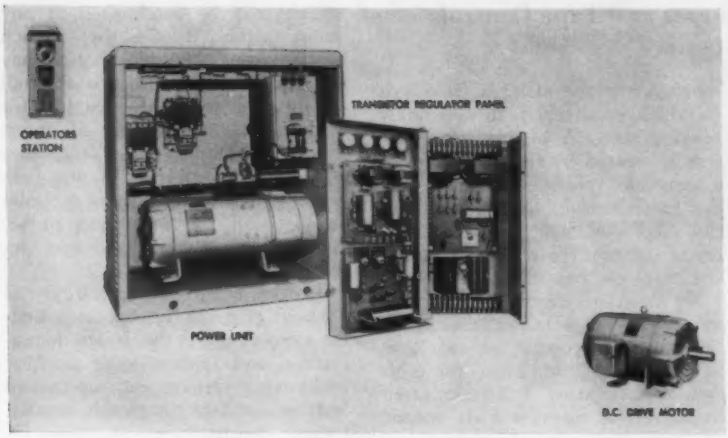


Fig. 1. Select-A-Spede direct-current, adjustable speed drive equipped with transistorized control

wide range of closely regulated speeds for machine tools. The drive components consist of a power unit, a direct-current rerated motor, and an operator control station. The brain of the system is a transistor regulator of printed circuit construction.

Also to be displayed is the Allispede drive seen in Fig. 2 which provides adjustable speed from an alternating-current power supply. In this drive, an induction motor produces infinitely adjustable speed over a wide range through the use of adjustable-diameter discs and a ribbed belt. Speeds as low as 1 rpm and as high as 10,000 rpm are made available by a combination of the drive and an integral gear head. Speed reductions up to 8 to 1 are available. The drive can be supplied with a drip-proof, totally enclosed or explosion-proof motor. A new adjustable speed, direct-current drive which is suited for applications requiring high response and rapid reversing will also be displayed.

The motors to be introduced include a small, light Flexitorq direct-current motor with fast response, a wide speed range, and high overload capacity. A Syncro-Spede synchronous induction motor, available in ratings up to 100 hp and larger, has the constant speed characteristics of a direct-current excited, salient pole type synchronous motor. Exceptional short motor length is the feature of the new Pancake motor, Fig. 3. This flange type motor is of conventional radial air-gap design and can be used in applications where space is limited. It is up to 54 per cent shorter than a standard flange type motor of equal rating. The Louis Allis wound rotor motor has been completely redesigned to meet NEMA standard dimensions in frame sizes 213 through 326 U. The new standard permits an appreciable reduction in frame size for a given rating, as compared to the old design. They are available in drip-proof and totally enclosed, non-ventilated construction.

Circle 658 on Readers' Service Card

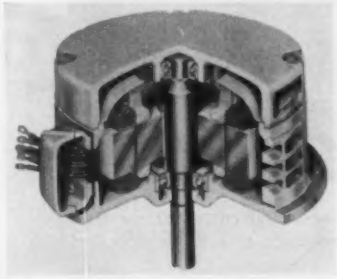


Fig. 3. Pancake short-length motor for limited space applications

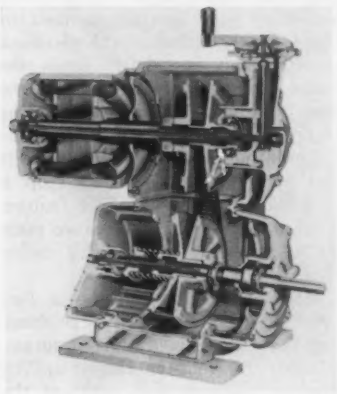


Fig. 2. Allispede mechanically adjustable speed drive to be exhibited by Louis Allis Co.

Cutler-Hammer Switches

Booth 142

Cutler-Hammer, Inc., Milwaukee, Wis., will display a new line of limit switches specifically designed for use on high-speed, precision production machines. The switches (Fig. 1) are sealed externally and internally to check seepage of oil, coolants, moisture, and abrasive grit and have enclosed but visible contacts. They are available in fourteen different operating heads and in both surface and flush type mountings. In addition, the company will exhibit illuminated computer type switches, Fig. 2. These units, which consist of maintained and momentary contact switches and a panel indicating light, are designed for use in data systems.

Fig. 1. Cutler-Hammer limit switch for control of precision production machines

Circle 659 on Readers' Service Card

Fig. 2. Snap-in, illuminated computer type switch introduced by Cutler-Hammer, Inc.

NEW PRODUCTS AT THE NAVY PIER

Bendix Inspection Instruments and Tape Controls

Booth 530

Bendix Corporation's Industrial Controls Section, Detroit, Mich., will introduce a new concept in two-dimensional inspection techniques at the Production Engineering Show. The Ferranti FI-22 coordinate inspection machine, Fig. 1, is a compact, solid-state unit which can read out hole center locations in two axes simultaneously to an accuracy of 0.001 inch. A skilled operator, can be ten times more productive using this unique single-unit inspection instrument for checking dimensions on complex workpieces.

Measurement is accomplished by moving a probe along a fixed axis to which is attached an accurately ruled grating. A moiré fringe pattern is created by the imposition of a movable reference grating over the fixed grating. By reading both the dark and light phases of the fringe pattern, the electronic counting units of the instrument record 0.001-inch increments on a scale ruled with 500 lines per inch. Probe position is displayed on two sets of position indicators—one for each axis. The system will accurately record probe movement at speeds up to 30 inches per second.

The machine has a floating zero which may be established at any point within its 24- by 15-inch working range. Positive motion may be read in either direction through the use of inverting switches for each axis. A selection of interchangeable taper and flat probes permits the inspection of any hole or edge location. By using a scribe in place of the inspection probe, the machine is capable of fine layout work.

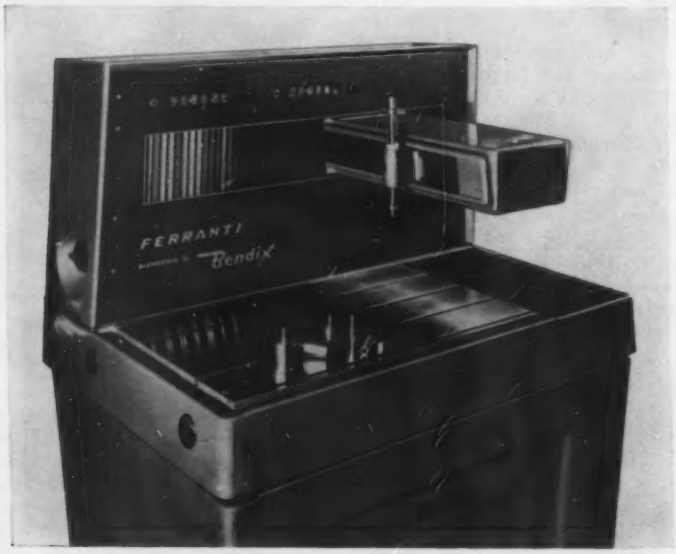


Fig. 1. Ferranti coordinate inspection instrument reads out hole center locations on two axes at once

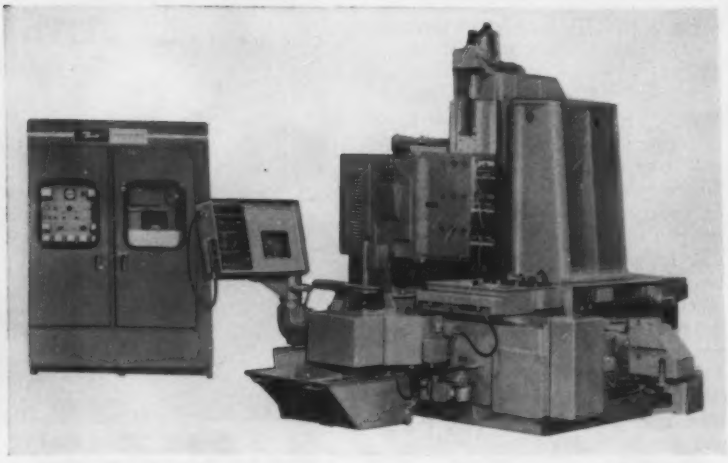


Fig. 2. DynaPath-20 numerical control programs Numeric-Keller machine

In the same booth, the DynaPath-20 (Fig. 2) incorporates Bendix's experience in the design, manufacture, and application of machine tool control systems with up-to-date features, such as completely transistorized construction, automatic interpolation of circular cutter paths, and binary-coded decimal input tape format. The DynaPath-20 will be demonstrated on a three-spindle Pratt & Whitney Numeric-Keller. This system, which has an electronic resolution of 0.0002 inch, is capable of machining parts to a tolerance of less than 0.001 inch.

The Industrial Controls Section, long in the numerically controlled contouring field, will introduce its first numerical positioning system at the Exposition. The new machine control unit, designated DynaPoint-20, will be demonstrated on a Moore jig borer, Fig. 3. It operates on a closed-loop servo system and is capable of an electronic resolution of 0.00001 inch. With this definitive ability, the unit can position the jig borer table to tolerances of less than 0.0001 inch within the range of table travel. Motion is simultaneous in both axes.

The DynaPoint-20 is a compact, solid-state unit, occupying only 6 square feet of floor space. Its mechanical tape reader uses standard eight-channel binary-coded decimal paper or plastic tape. Ten auxiliary functions may be programmed on the tape, in addition to dimensional data, using standard flexowriter codes. Extreme flexibility of operation is provided by separate dial input switches which will allow manual positioning of the work-piece to the nearest 0.0001 inch. Setup is simplified by a zero offset feature. It permits the initial reference point to be located on the work rather than on the table.

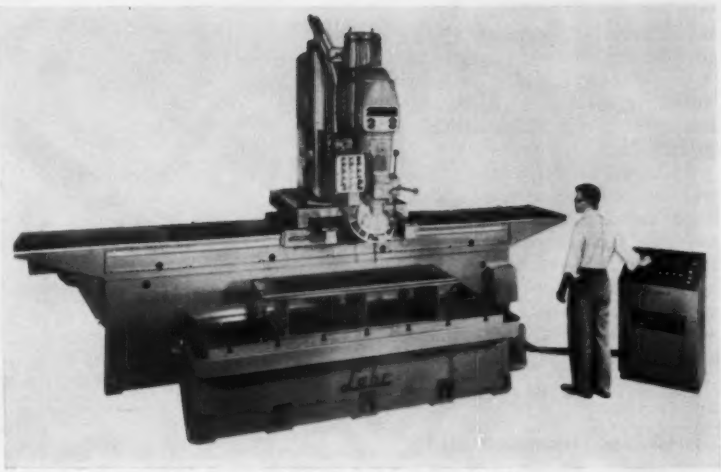
Also on display will be a Ferranti FP-22 tape-controlled positioning unit (not illustrated) programming a Burgmaster turret drilling machine. The system positions the work-piece to an accuracy of 0.0005 inch and controls such auxiliary functions as tool selection,

coolant flow, and also spindle speed.

The FP-22 is a compact, completely transistorized unit which has many features not previously available in this country. Its diffraction-grating measuring system is independent of the machine's drives so that table position is measured directly. Accuracy of the system does not depend on the precision of the machine's gearing and lead-screws. The unit's floating zero facilitates quick setup with inexpensive tooling, since the reference point may be located on the work-piece rather than locating the work to a specific zero point. Additional flexibility is provided by the manual dial input and position indicators. With these features, work may be interrupted at any point and additional operations performed without loss of synchronization with the tape.

Binary-coded decimal tapes are prepared on standard Flexowriter equipment. The format includes a parity check for tape errors, while the feedback information is continuously checked by means of ternary logic circuits. Another safety feature of the FP-22 is its battery power supply, which guards against troublesome line-voltage fluctuations.

Circle 660 on Readers' Service Card



Lahr special drilling machine with turret head that is driven by a Reliance two-axis, point-to-point numerical control system

Reliance Electric Features Numerical Control System

Booths 411, 413, 415, 417

Reliance Electric & Engineering Co., Cleveland, Ohio, will display a new programmed numerical positioning control. The system which is of the two-axis, point-to-point type will be applied to the special large drilling machine seen in the accompanying illustration. This equipment made by the Lahr Machine & Tool Corporation, Toledo, Ohio, has a 90-inch fixed table over which is mounted a Brown & Sharpe Model B six-face turret drilling head. The head can be programmed for 90 inches of movement on the longitudinal axis, and 20 inches of movement on the transverse axis. Although the spindle feed, or Z axis, of this machine will not be programmed, turret selection will.

Input data will be introduced to the system by one-inch wide, eight-track punched tape or by manually operated switches. Decimal read-out of the input data is provided by numerical indicator tubes. Numerical indicator tube read-out of the turret face selected will also be provided, as will a dial switch to allow manual selection of the turret face. Full-range zero offset control will be available for both table and saddle motions, thus allowing the zero data lines to be set to any position desired. The position-measuring system for both the head and saddle motions will be by three-speed synchro data packages mounted and geared to the machine lead-screws. Resolution and accuracy of both programmed motions will be 0.001 inch and plus or minus 0.001 inch respectively. Maximum positioning speed will be 150 inches per minute.

In addition, a three-axis, point-to-point positioning system will be applied to a Chas. G. Allen Co. vertical drilling machine to be displayed in the Allen booth at the NMTBA Machine Tool Show. This equipment

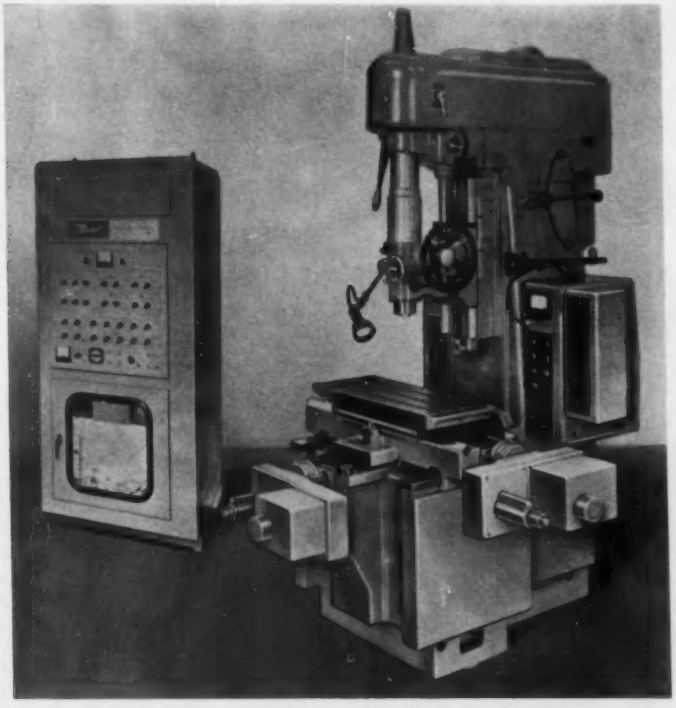
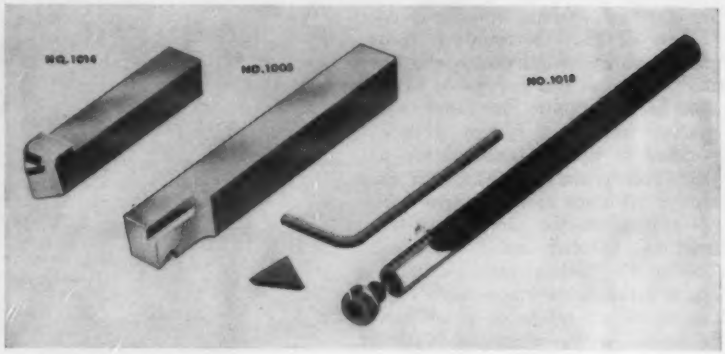


Fig. 3. Bendix enters numerical positioning field with the DynaPoint-20 controlling a Moore jig borer table

will have a 44- by 25-inch compound table provided with 16 inches of programmed movement in both the X and Y axes. Rapid traverse of the vertical spindle quill (Z axis) to and from the feed position will be programmable.

Included in the Reliance display will be several integral and fractional horsepower alternating-current motors; a cutaway model of a Reeves fractional horsepower mechanically adjustable-speed drive; a variable-speed Speedranger; an all-electric adjustable-speed drive system; and a tracer head.

Circle 661 on Readers' Service Card



Diamond and carbide turning and boring tools by Arthur A. Crafts Co., Inc.

Crafts Diamond and Carbide Cutting Tools

Booth 454

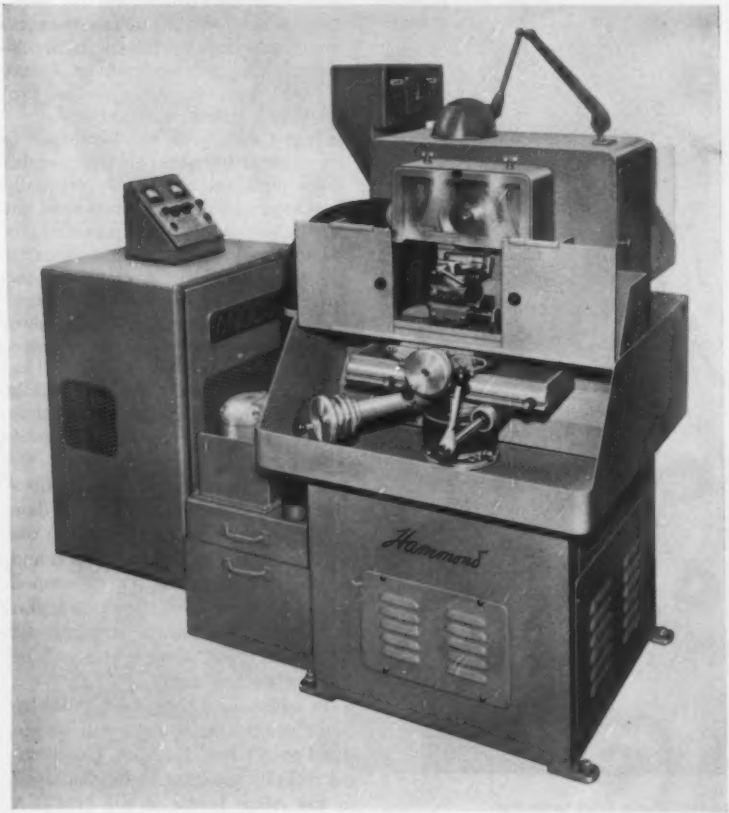
Arthur A. Crafts Co., Inc., Boston, Mass,. will show three new cutting tools that have been added to its line of diamond and carbide tools for automatics. Its No. 1014 diamond commutator turning tool, left, is designed specifically for machining commutators of fractional-horsepower motors. The tool is available in four popular sizes.

Crafts No. 1005 tool, center, has a 3/8-inch square shank and a 15-degree shear angle. It is ideal for cutting copper, aluminum, magnesium, and plastics. The heat-treated shank accommodates a triangular carbide insert that can easily be replaced with a hexagonal wrench. No. 1005 is stocked in five styles of either hand.

At the right is a No. 1018 boring-bar for deep, small bores. Hexagonal-head, disposable carbide screw-tips can be either discarded or resharpened. The tool is designed for holes of 1/4-inch diameter and larger. A sleeve adaptor is available for use in jig-boring machines.

Circle 662 on Readers' Service Card

Hammond electrolytic tool grinder has oscillating cup-wheel on one end of the machine and a chip-breaker wheel on the other



Hammond Electrolytic Tool Grinder

Booth 432

One of the machines to be exhibited by Hammond Machinery Builders, Inc., Kalamazoo, Mich., is their Model CME-66 tool grinder. This is designed to allow the smaller manufacturer to take advantage of the savings involved in electrolytic grinding of carbide tools. This grinder provides oscillating cup-wheel grinding on one end and chip-breaker grinding on the other. The cup-wheel oscillates at 60 strokes per minute and can be set for a stroke length up to 1 1/2 inches. On the other end a VCSE vise is used for chip-breaker grinding.

The machine is available in three styles—conventional, with manual spark control, or with automatic spark control. The first style grinds with a diamond wheel in the conventional manner, but a power pack for electrolytic grinding can be connected at any time. As an electrolytic grinder the CME-66 is equipped with either a built-in, 150-ampere Anocut power pack having manual spark control, or a regular Anocut power pack with automatic spark control. All three styles are equipped with a liquid (coolant or electrolyte) pumping system and MistKolector.

Circle 663 on Readers' Service Card

(New Products at the Navy Pier continued on page 294)

ON VIEW AT THE

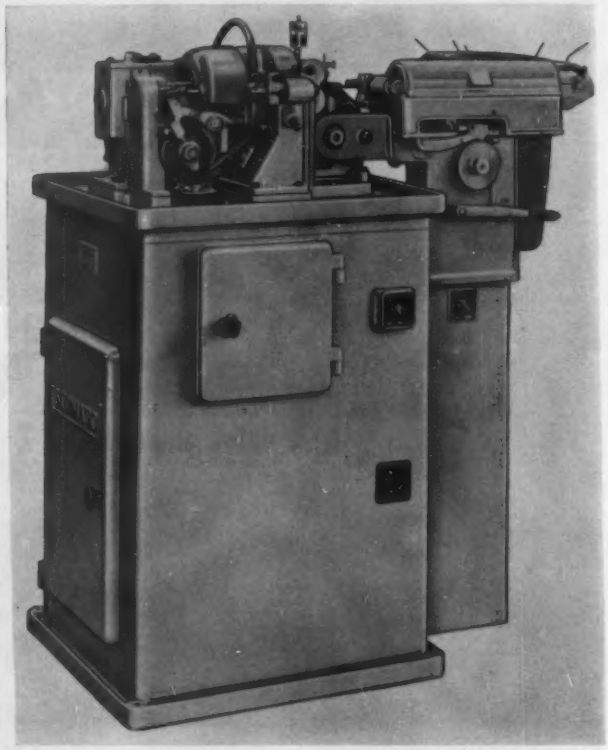
COLISEUM

SECOND INTERNATIONAL MACHINERY SHOW

Chicago, Illinois

September 7 to 15

New Equipment on View



Imported Production Machinery Demonstrated by Cosa

Booth 653

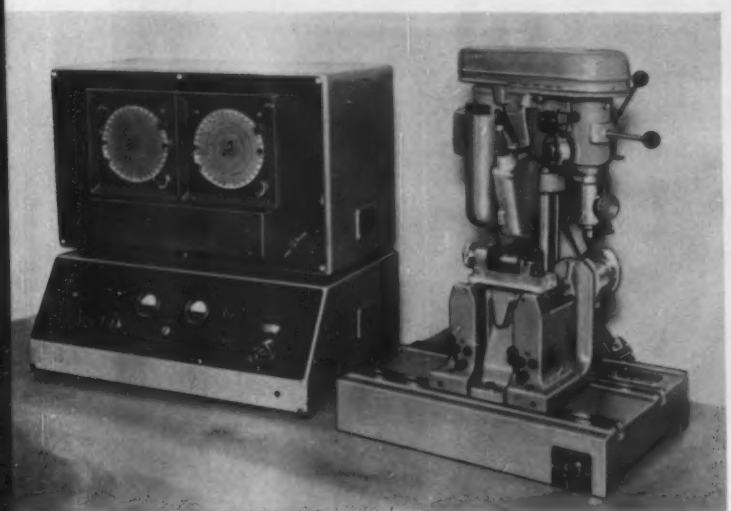
A great variety of European precision machine tools and automatic production machines will be shown in operation in the two booths housing the exhibit of Cosa Corporation, New York City. The Deckel LK jig-boring and jig-grinding machine, Fig. 1, offers unique duplex features in a machine of extreme precision. A simple interchange of heads for

Fig. 1. (Above left) Substitution of heads changes Deckel LK duplex jig borer to a jig grinder

Fig. 2. (Above right) Escomatic D4 machine turns forms and ends of small parts using coil stock

Fig. 3. (Below left) Schenck R06 balancer for small, fast-spinning parts

Fig. 4. (Below right) Studer RHU 450 match-grinds all sorts of close-tolerance internal and external work



at the Coliseum

Fig. 5. (Left) External production grinder, Studer Model RM 250-L, introduces single-lever control. Fig. 6. (Right) Production program controls Model 170 magazine-loaded gear hobber

the same basic machine converts it easily into either a jig borer or jig grinder. Direct numerical readings are clearly indicated in 0.0001-inch graduations.

The new Escomatic D4, Fig. 2, does automatic precision form-turning and end operations on small parts. From a given quantity of coil stock, the efficiency of the lathe saves enough time and material to produce from 60 to 70 per cent more parts than can be produced from an equal quantity of bar stock.

The Schenck RO6 balancing machine, Fig. 3, is an ultraprecise balancer for small parts which revolve at speeds between 10,000 and 30,000 rpm. Equal precision is attained with either manual or automatic cycling operation.

Two Studer universal and cylindrical grinders will be demonstrated grinding parts to extremely close tolerances. The first RHU 450 (Fig. 4), does match grinding, internal and external grinding, as well as superfine and lap-grinding to the most exacting requirements for geometrical accuracy and surface finish. The second, RM 250-L (Fig. 5), an external production grinder shown for the first time in this country, is one-lever-controlled, with automatic cycling and table traverse. Both of these grinders can be equipped with measuring devices—the Movolimit for outside-diameter grinding, and the Deltalimit for match grinding—to size work-pieces automatically, control spark-out, and to shut off the machine when the part is finished.

The Koepfer gear hobber, Model 170, Fig. 6, is a fully automatic production machine with magazine feeding, which limits the labor necessary to loading the magazine and checking finished work-pieces. It performs equally well in conventional or climb hobbing. The hobber is equipped with production program control.

In Booth 117, Cosa will demonstrate Model CN63 Trumpf universal sheet metalworking machine with a copy-nibbling attachment.

Circle 664 on Readers' Service Card

Easco Sparcard Machine and Metal Disintegrator

Booth 222

Easco Products, Inc., Ann Arbor, Mich., will feature Sparcard carbide-deposition equipment. This process, which bonds carbides to tool surfaces by electrical discharge, increases the hardness and wear resistance of high-speed tools. It can also prevent galling and thus increases the life of punches and dies. The carbide coating resists chipping or flaking. Both a Sparcard machine and an Electro Arc metal-disintegrator Model 2-DB, designed for speed in setup and operation, will be displayed in operation.

Circle 665 on Readers' Service Card

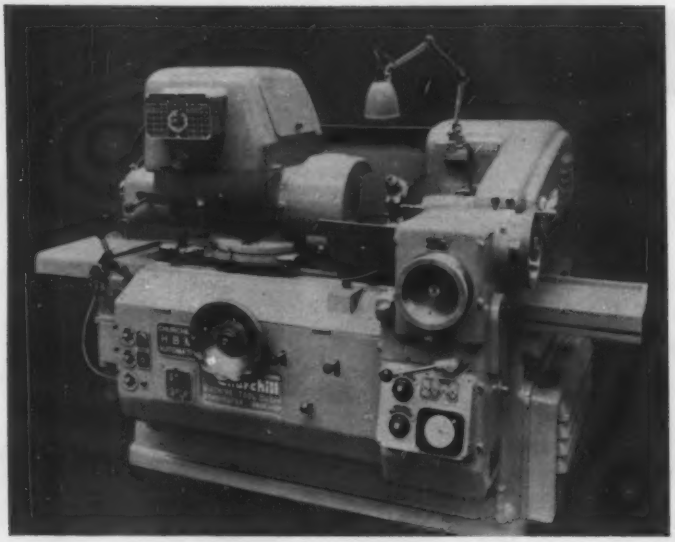


Fig. 1. Lapointe-Churchill HBM automatic internal grinding machine

Lapointe Stages Live Exhibit of British-Built Machines

Booth 521

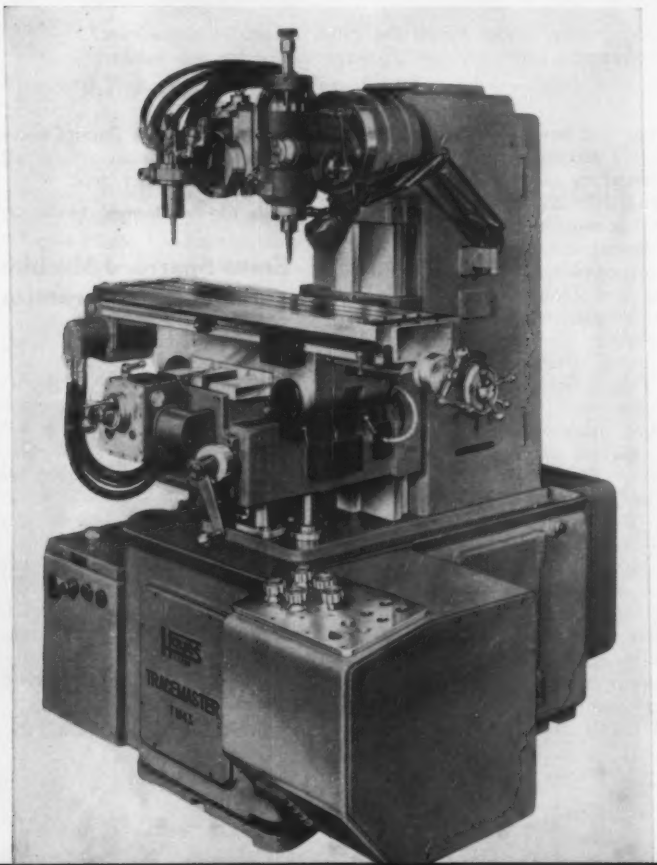
Lapointe Machine Co., Hudson, Mass., will have sixteen British-built machine tools on exhibition, all under power. They will be turning out production parts. The fine tolerances under which they operate will indicate the "in-built" quality of this group of general- and special-purpose machine tools.

In addition to the Lapointe personnel at the Show, there will be a large group of executives and machine demonstrators representing the several British machine sources.

The following machines have been selected for this working exhibit: Lapointe-Churchill Model HBM automatic internal grinder, Fig. 1; Lapointe-Hayes Model TM43A automatic copy die-sinking machine, Fig. 2; Lapointe-Butler 18-inch super shaper; Lapointe-Butler 36-inch open-side crank planer; Lapointe-Churchill Model BW 10- by 36-inch cylindrical grinder; Lapointe-Churchill Model NB 6- by 18-inch surface grinder; Lapointe-Lang Model JC6 chucking lathe; Lapointe-Lang Model 10B2 engine lathe; Lapointe-Parkinson Gearbur machine; Lapointe-Parkinson Model 5B Sunderland gear planer; Lapointe-Parkinson Model 2NU universal milling machine; Lapointe-Ward Model 3DS ram type turret lathe; Lapointe-Ward Model No. 7 Prelector saddle type turret lathe; Lapointe-Kitchen-Walker 4-foot 6-inch by 14-inch column radial drill; Lapointe-Kearns Model 450B Optimetric horizontal toolroom boring machine; and Lapointe-Sperry/Orcutt master dividing engine with tape control.

Circle 666 on Readers' Service Card

Fig. 2. Lapointe-Hayes TM43A automatic copy die-sinking machine

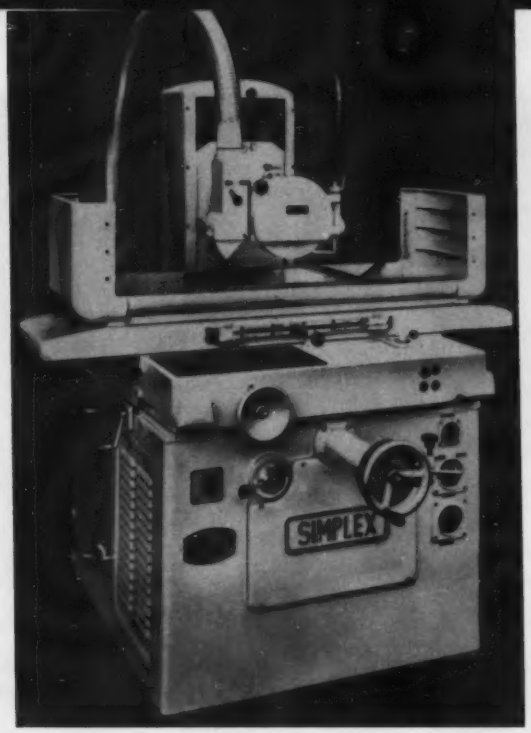


Hermes Exhibits Variety of Machine Tools

Booth 710

Hermes Machine Tool Co., Inc., of Long Island City, N. Y., will show a wide selection of equipment including surface grinders, radial drilling machines, a lathe, and a band saw and filing machine. A Blohm Simplex 7 surface grinder, Fig. 1, has a 12- by 28-inch capacity. It features a high column; a two-speed, 5 1/2-hp motor built as a single unit with the spindle; ball-bearing mounted table and cross-slide; rapid traverse for the cross-slide; and power elevation to the spindle. Longitudinal table movement is hydraulic and infinitely variable. Cross-slide is electrically controlled and infinitely variable.

In Fig. 2 is illustrated a Caser Model F50/5 radial drilling machine having a 16-inch diameter column and a 5-foot long arm. It provides preselection of sixteen speeds and nine feeds, single push-button hydraulic clamping of column and



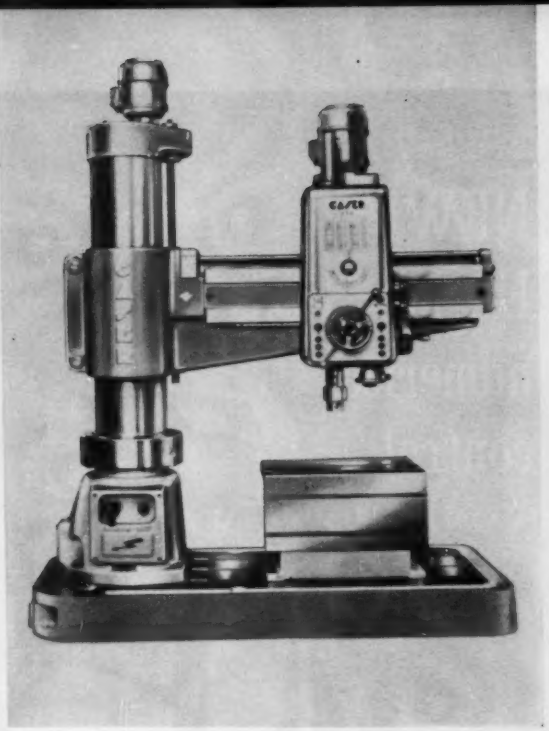


Fig. 1. (Left) Blohm Simplex 7 surface grinder with 12- by 28-inch capacity and a two-speed motor
Fig. 2. (Right) Caser Model F50/5 radial drilling machine has a 16-inch column and a 5-foot arm

head, and push-button elevation of the arm combined with automatic locking and unlocking of the arm on the column. A single clutch lever is used for starting, stopping, and reversing the spindle as well as for engaging speeds and feeds.

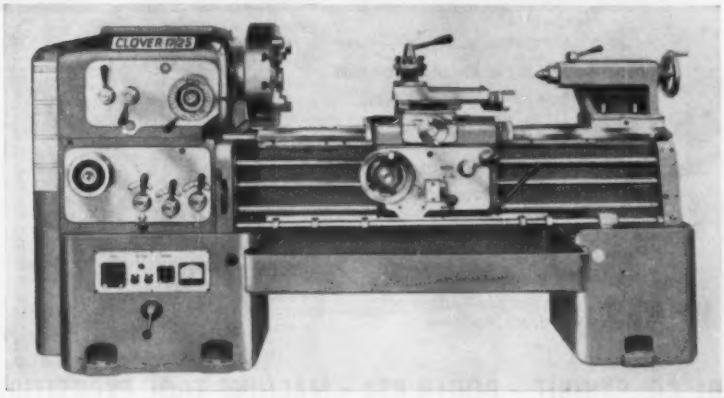
The Clover lathe shown in Fig. 3 is a gap lathe with 60 inches between centers. It has a normal 17-inch swing changing to 25 inches with the gap opened. The lathe features a 7-hp motor, an all-geared headstock, a three-bearing spindle, and spindle control by means of a double multiple-disc clutch combined with an electromagnetic brake. Twenty-four spindle speeds are available from 40 to 2450 rpm. A bar with five longitudinal stops is used for turning stepped shafts.

A Moessner Rekord Model SSF 500 metal band saw and filing machine is shown in Fig. 4. It has infinitely variable cutting speeds from 50 to 3000 fpm regulated by a handwheel. Speed can be read directly in feet per minute on a built-in speedometer. A direct high-speed drive of 7700 fpm permits friction cutting. The machine is equipped with a built-in butt welder, shear, and grinder; a chip blower; weight-operated feed; a four-way tilt table; and a 4-hp motor.

Also to be displayed is a Blohm Model HFS 9 hydraulic surface grinder with a capacity of 12 by 36 inches, and a Caser Model F25/3 radial drilling machine.

Circle 667 on Readers' Service Card

Fig. 3. Clover gap lathe has swing of 17 inches closed, 25 inches open



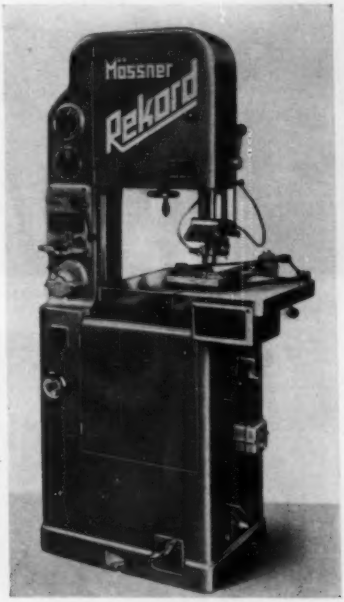


Fig. 4. Moessner Rekord metal band saw and filing machine

(New Equipment on View at the Coliseum continued on page 284)

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AMERICAN STANDARD CUT AND GROUND THREAD TAPS—19

Straight Shank Tapper Taps

(Machine Screw Sizes)

Carbon Steel—Cut Thread

General Dimensions

Size	Basic Major Diameter	Threads per Inch			Number of Flutes	Dimensions			Number of Threads Chamfered
		NC UNC	NF UNF	NS		Length Overall A	Length of Thread B	Diameter of Shank D	J
4	0.112	..	..	36	3	6	9/16	0.076	11 to 12 threads
4	0.112	40	..	..	3	6	1/2	0.080	11 to 12 threads
4	0.112	..	48	..	3	6	13/32	0.085	11 to 12 threads
5	0.125	40	..	..	3	8	1/2	0.093	11 to 12 threads
5	0.125	..	44	..	3	8	7/16	0.096	11 to 12 threads
6	0.138	32	..	..	3	8	5/8	0.097	11 to 12 threads
6	0.138	..	40	..	3	8	1/2	0.106	11 to 12 threads
8	0.164	32	..	..	3	9	5/8	0.123	11 to 12 threads
8	0.164	..	36	..	3	9	9/16	0.128	11 to 12 threads
10	0.190	24	..	..	3	11	13/16	0.136	11 to 12 threads
10	0.190	..	32	..	3	11	5/8	0.149	11 to 12 threads
12	0.216	24	..	..	3	11	13/16	0.162	11 to 12 threads
12	0.216	..	28	..	3	11	23/32	0.170	11 to 12 threads

All dimensions are given in inches.
These taps are furnished with plain round shanks.
All taps have external center on thread end.

Tolerances*

Element	Range	Direction	Tolerance
Length Overall (A)	4 to 12 incl.	Plus or Minus	1/16
Length of Thread (B)	4 to 12 incl.	Plus or Minus	3/64
Diameter of Shank (D)	4 to 12 incl.	Minus	0.005

All dimensions are given in inches.

*For eccentricity tolerances of tap elements, see table in MACHINERY'S Data Sheet published in February, 1960, page 186.

Extracted from American Standard Taps—Cut and Ground Threads (ASA B5.4-1959), with the permission of the publisher, the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N.Y.

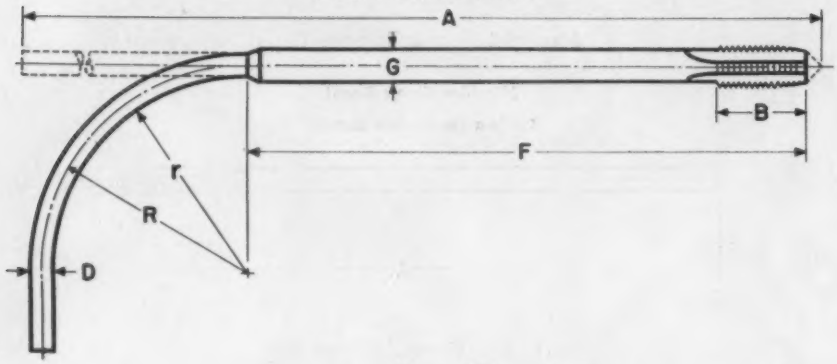
MACHINERY'S DATA SHEET

AMERICAN STANDARD CUT AND GROUND THREAD TAPS—20

Bent Shank Tapper Taps

(Fractional Sizes)

Carbon Steel—Cut Thread



General Dimensions

Diameter of Tap	Size of Machine	Threads per Inch			Number of Flutes	Dimensions						
		NC UNC	NF UNF	NS		A	B	D	F	G	R	r
3/16	1/4	..	..	24	3	6 1/2	1/2	0.133	3 3/4	...	1 1/4	1.183
3/16	1/4	..	..	32	3	6 1/2	3/8	0.147	3 3/4	...	1 1/4	1.176
1/4	1/4	20	..	..	3	6 1/2	5/8	0.180	3 31/32	...	1 1/4	1.160
1/4	1/4	..	28	..	3	6 1/2	5/8	0.194	3 5/8	...	1 1/4	1.153
5/16	1/4	18	..	..	3	6 1/2	11/16	0.235	3 5/8	...	1 1/4	1.133
5/16	1/4	..	24	..	3	6 1/2	5/8	0.245	3 5/8	...	1 1/4	1.128
1/4	3/8	20	..	..	3	8 3/4	5/8	0.180	4 17/32	...	1 7/8	1.785
1/4	3/8	..	28	..	3	8 3/4	5/8	0.194	4 1/2	...	1 7/8	1.778
5/16	3/8	18	..	..	3	8 3/4	3/4	0.235	4 15/32	...	1 7/8	1.757
5/16	3/8	..	24	..	3	8 3/4	3/4	0.245	4 7/16	...	1 7/8	1.752
3/8	3/8	16	..	..	3	8 3/4	13/16	0.289	4 15/32	...	1 7/8	1.730
3/8	3/8	..	24	..	3	8 3/4	3/4	0.289	4 3/8	0.321	1 7/8	1.730
3/8	1/2	16	..	..	3	12	13/16	0.289	5 29/32	...	2 1/2	2.355
3/8	1/2	..	24	..	3	12	3/4	0.289	5 7/8	0.321	2 1/2	2.355
7/16	1/2	14	..	..	3	12	1 3/16	0.340	6 3/32	...	2 1/2	2.330
7/16	1/2	..	20	..	3	12	1 3/16	0.340	6 1/16	0.373	2 1/2	2.330
1/2	1/2	13	..	..	3	12	1 5/16	0.395	6 1/16	...	2 1/2	2.302
1/2	1/2	..	20	..	3	12	1 5/16	0.395	6 1/32	0.435	2 1/2	2.302
9/16	3/8	12	..	..	3	15	1 7/16	0.449	7 3/32	...	3 3/4	3.525
9/16	3/8	..	18	..	3	15	1 5/16	0.449	7 1/4	0.490	3 3/4	3.525
5/8	3/8	11	..	..	3	15	1 5/8	0.502	7 1/4	...	3 3/4	3.499
5/8	3/8	..	18	..	3	15	1 5/16	0.502	7 1/4	0.553	3 3/4	3.499
3/4	3/8	10[1]	..	..	3	15	1 13/16	0.605	7 3/16	...	3 3/4	3.447
3/4	3/8	..	16	..	3	15	1 5/8	0.605	7 3/16	0.669	3 3/4	3.447

All dimensions are given in inches.
[1]Recommended only for thin nuts.
Bent shank tapper taps are designed for use in automatic tapping machines.
All taps up to 3/8 inch inclusive, have external center thread end; sizes 7/16 inch and larger have internal center in thread end.

Tolerances*

Element	Range	Direction	Tolerance
Length Overall (A)	1/8 and 3/16 incl.	Plus	1/16
	1/4 to 3/4 incl.	Plus	1/8
Length of Thread (B)	1/8 to 1/2 incl.	Plus or Minus	1/16
	9/16 to 3/4 incl.	Plus or Minus	3/32
Diameter of Shank (D)	1/8 to 1/2 incl.	Minus	0.005
	9/16 to 3/4 incl.	Minus	0.006

All dimensions are given in inches.

*For eccentricity tolerances of tap elements, see table in MACHINERY'S Data Sheet published in February, 1960, page 186.

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PROGRESSIVE MANUFACTURERS USE BALL BUSHINGS—A MAJOR IMPROVEMENT AT A MINOR COST

ON VIEW AT THE COLISEUM

DoALL Power Saw and Cold-Point Drill

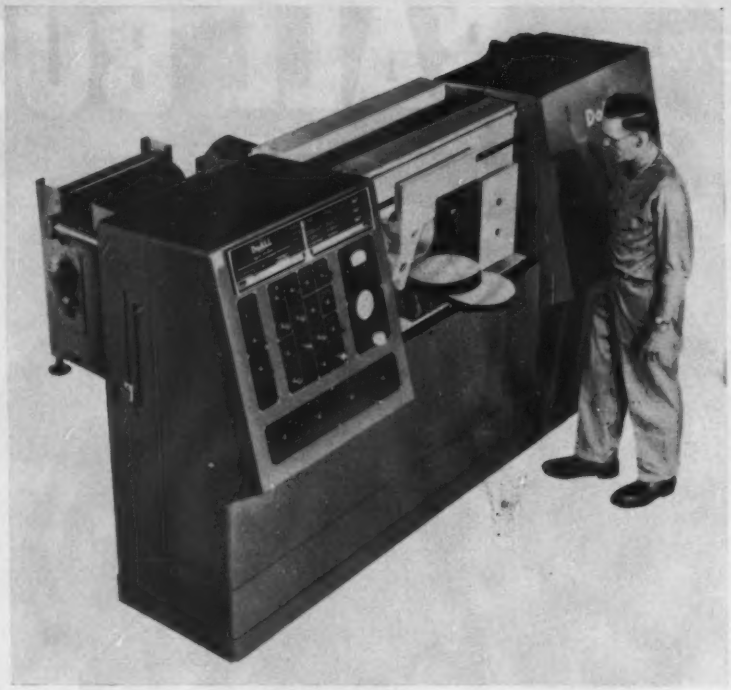
Booth 528

The DoALL Co., Des Plaines, Ill., will demonstrate a new power cutoff saw and a drill for cold-point drilling, among other displays, to show the value of new machines, cutting tools, and gaging equipment. The power cutoff saw, called the Continental, is here illustrated. It was designed for continuous production operation with the new 2-inch saw bands made by the company—the Imperial, tungsten-carbide, Super Demon, and Dart types. The saw has a capacity of 16 by 20 inches, indexes automatically from 0 to 24 inches in thousandths of an inch, and leaves a stub end of only 2 1/2 inches. With manual indexing this is reduced to 1 inch.

In the demonstration of cold-point drilling of difficult-to-drill materials, the coolant is fed through the drill stem and is ejected at the lead edges of the point. This keeps both the drill and work-piece cool, eliminates backoff, and makes it possible to bore holes without burning.

The company will exhibit a new Model C-70 power saw, which features a larger drive system, replaceable index-table guides, a bigger pivot shaft for the sawing head, and spring-loaded carbide guides through which coolant is applied. Two new grinders—a production and a manual model—and a new Contour-matic band machine using the new type saw bands will also be demonstrated.

A special Productivity Show, complementing the Coliseum exhibit, will be presented daily in the company's Hall of Progress, Des Plaines, Ill., a suburb of Chicago. Two free bus tours each day are scheduled to take visitors to see a score of additional new machine demonstrations. Included will be the sawing of semiconductor materials with an I/D Micro-Slicer, and the cutting of metallic honeycomb with an Electro band machine.



Continental power cutoff saw to be introduced by the DoALL Co.

Circle 668 on Readers' Service Card

Cri-Dan Threading Lathes

Booth 518

Three machines to be shown by the Gisholt Machine Co., Madison, Wis., represent the Cri-Dan line of single-point, semi-automatic threading lathes. The Cri-Dan B threading lathe (Fig. 1) can cut single- or multiple-start, coarse- or fine-pitch, left- or right-hand, parallel or tapered threads up to shoulders on all types of internal and external threading operations. Some cost-cutting features are fifteen-minute setups, faster threading times than can be obtained by either grinding or milling, and the advantages offered by single-point carbide threading tools. The machine can handle material from titanium and tough alloy steels down to brass and other nonferrous metals at high speeds and feeds.

Fig. 1. Gisholt Cri-Dan B threading lathe handles all types of internal and external threading operations

Cri-Dan FT80 threading and turning lathe, Fig. 2, is specifically designed to perform all types of threading operations done on the "B"—but with greater capacity—in addition to contour turning. Single-point carbide threading tools are mounted on a cross-slide resting on a longitudinal slide. Both are supported by a saddle and carriage. Positive cam action moves the two

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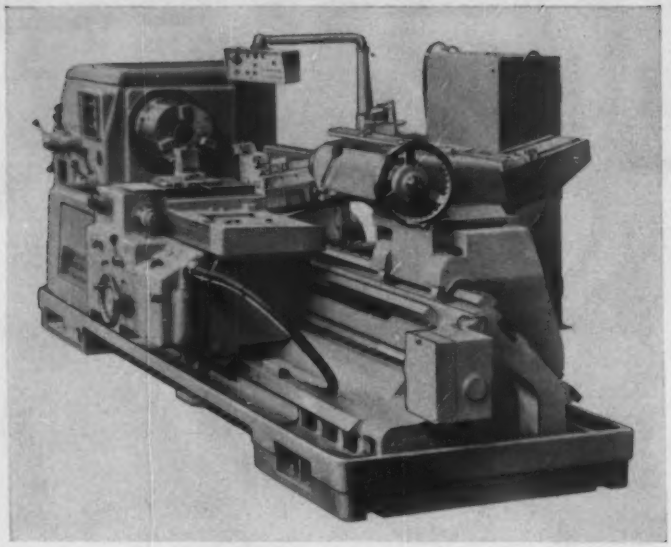


Fig. 2. Cri-Dan FT80 threading and turning lathe performs all types of threading in addition to contour turning

slides, with the combined motions moving the tool into the work a predetermined distance. Tool infeed and number of passes are preset. The machine stops after completion of the cycle.

Turning is handled from a separate saddle having its own ways and a self-contained drive. An independent, template-controlled tracing cross-slide is mounted on the saddle of the FT80.

A small Cri-Dan Model A semi-automatic threading lathe, Fig. 3, is capable of handling all types of threading and is built to meet the particular needs of manufacturers of small precision mechanisms. Up to 150 passes per minute can be made by the carbide tool. Clutch and chucking controls are operated by foot pedals for peak efficiency.

Circle 669 on Readers' Service Card

Universal-Automatic Machines for Secondary Operations

Booth 748

Universal-Automatic Corporation, Schiller Park, Ill., will exhibit a new line of automatic machines and systems for secondary operations. The equipment, which will be demonstrated performing secondary operations under typical shop conditions, are especially useful for drilling, tapping, reaming, hollow-milling, nut-tapping, cross-drilling, countersinking and other similar type operations.

Universal-Automatic machines and systems consist of one or more units which may be mounted at any angle or in any position desired. Each unit is self-contained and has an individual spindle-drive motor with speeds ranging from 500 to 10,000 rpm. This enables each spindle to be run at the proper speed for the operation being performed. The unit has a maximum spindle stroke of 2 1/2 inches and is adjustable down to 1/8 inch. Capacity of the units are from 0.020 to 3/8 inch for drilling and/or up to 3/8 inch for tapping in mild steel. Each spindle is advanced and retracted by twin, double-acting air cylinders complete with intake and exhaust air-metering controls, and air-pressure regulator and gage, operating on shop air supply (15 to 100 psi as required).

The following machines will be in operation: a single-spindle horizontal machine rivet-drilling brass parts; a two-spindle horizontal machine used as a nut tapper; a two-spindle horizontal machine, here illustrated, for cross-drilling aluminum; and a single-spindle vertical machine for deep-hole drilling brass. Universal-Automatic will also show a secondary operation unit and a variety of work-holding fixtures and feed mechanisms.

Circle 670 on Readers' Service Card

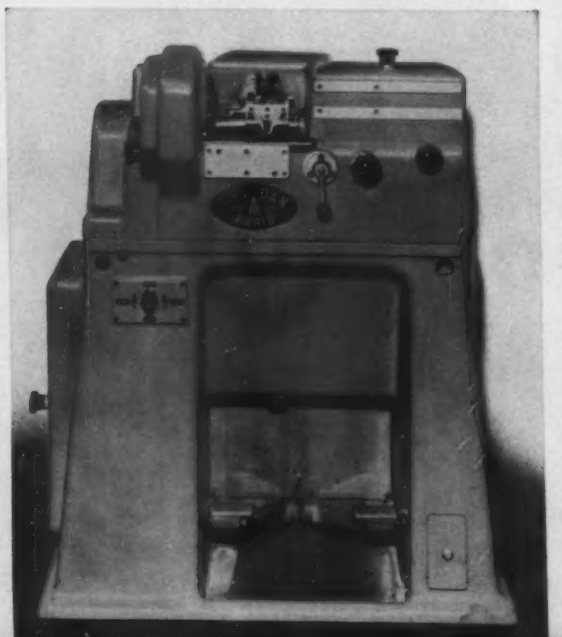
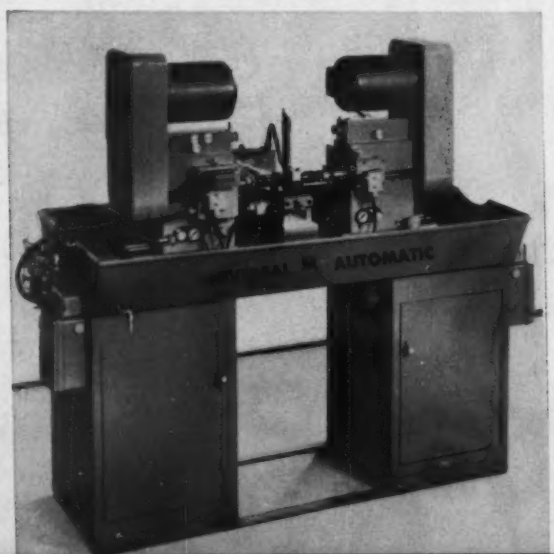
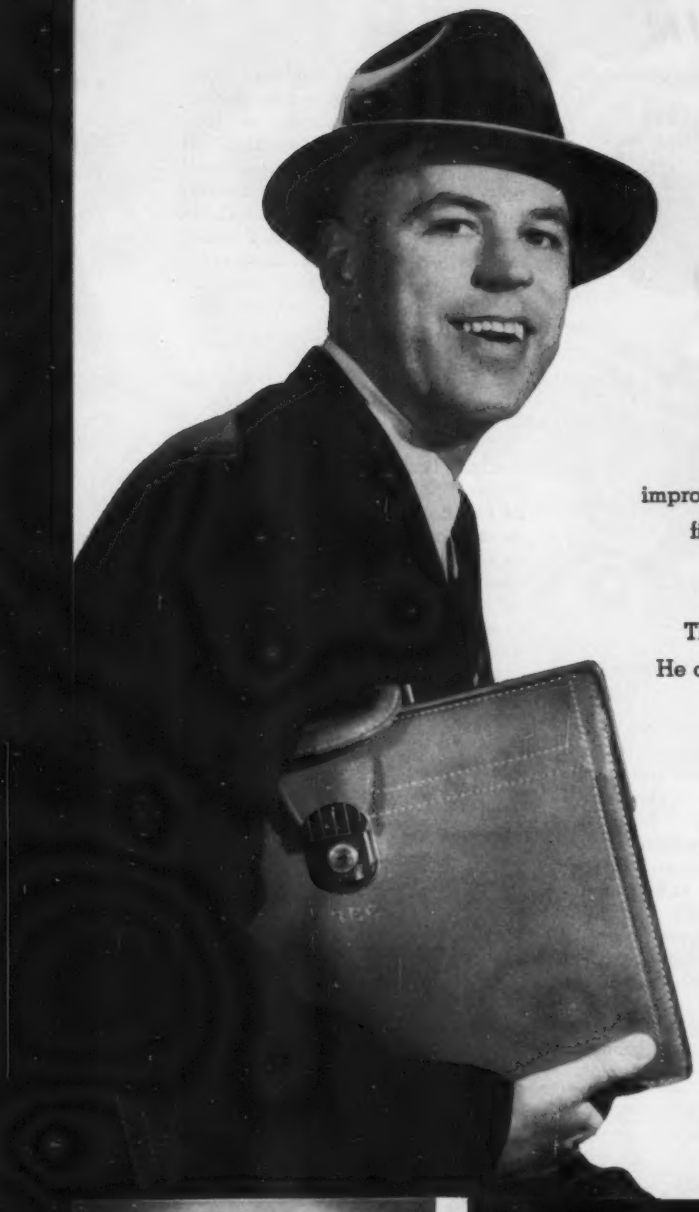


Fig. 3. (Left) Model A threading lathe for precision work

(Below) Universal-Automatic two-spindle horizontal machine





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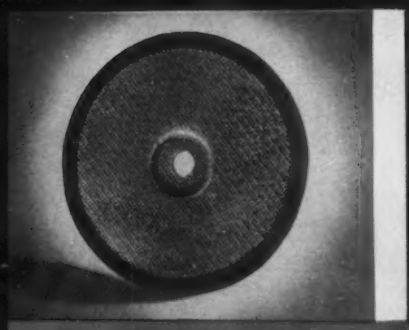

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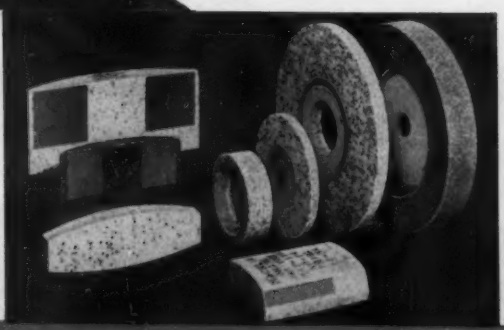

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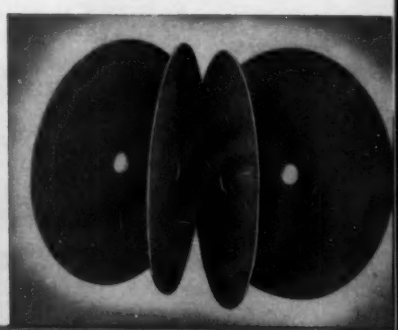

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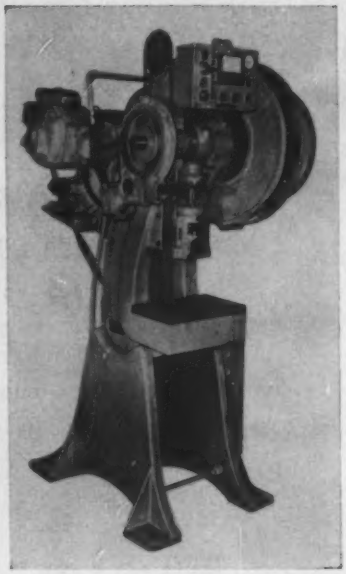
ON VIEW AT THE COLISEUM

Zeh & Hahnemann High Speed OBI Press

Booth 751

Speeds to 1000 strokes per minute are practical on the high-production OBI press to be demonstrated by Zeh & Hahnemann Press Division, Dechert Dynamics Corporation, Palmyra, Pa. Features include a Zeh-Flex air clutch which eliminates bending stresses caused by the flywheel.

Circle 671 on Readers' Service Card



High-production OBI press

Johansson Radial Drilling Machines

Booth 215

A 360-degree rotation of a sliding 3-foot long radial arm makes it possible to drill any hole required in a work-piece up to 6 feet in diameter and more than 4 feet high with the precision radial drilling machines to be shown under power by the I. O. Johansson Co., Skokie, Ill. Two work stations are accessible: a 20- by 40-inch table that adjusts vertically through a distance of 16 inches, and a 22- by 24-inch rear work platform. Both have accurately ground work surfaces, finished T-slots, and a coolant trough.

Power elevation moves the column a distance of 12 inches, giving a 53-inch maximum distance from spindle to work surface. Positive locks on all movements can be instantaneously engaged through a control panel selector. Automatic locks and power elevation attachments have been designed so that the drill head can be locked in any desired position radially and horizontally, yet can be moved vertically with the drill remaining square to the table within 0.002 inch in 12 inches of travel. In this way, holes up to 18 inches deep can be drilled. Drill heads incorporate a fast-adjusting depth stop, a built-in drill ejector for quick tool changes, quill power feed, and semi-automatic tapping. Three models are available having capacities up to 1 3/4 inches in cast iron. All units incorporate direct gear drive with positive speeds in various ranges: 45 to 3000 rpm.

Circle 672 on Readers' Service Card

Crane Lapmaster

Booth 550

Crane Packing Co., Morton Grove, Ill., will demonstrate its new Model 24 Lapmaster, which is a completely redesigned version of the present 24-inch machine. It will lap parts of almost any shape, form, or material on a production basis within tolerances of one light band or less, and with finishes of 2 to 3 micro-inches.

A new abrasive distribution system maintains the correct mixture of compound and vehicle from initial filling to the last drop. Pneumatic lifts to speed loading and unloading of small and medium-size parts are standard. The lifts simplify raising and lowering of conditioning rings and/or pressure-plates. A single handwheel permits easy adjustment of conditioning rings to compensate for normal wear patterns in the lapping plate.

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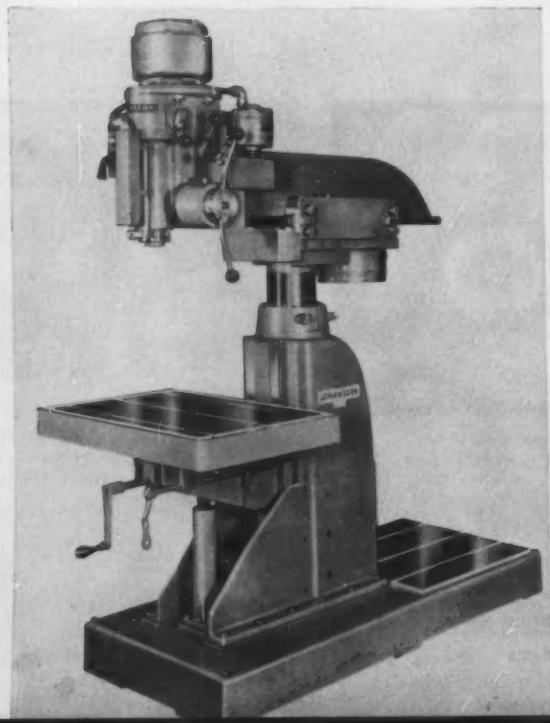
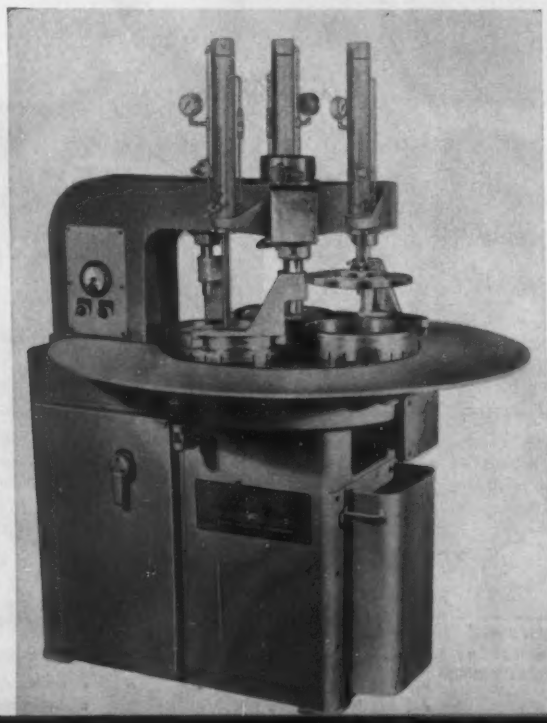
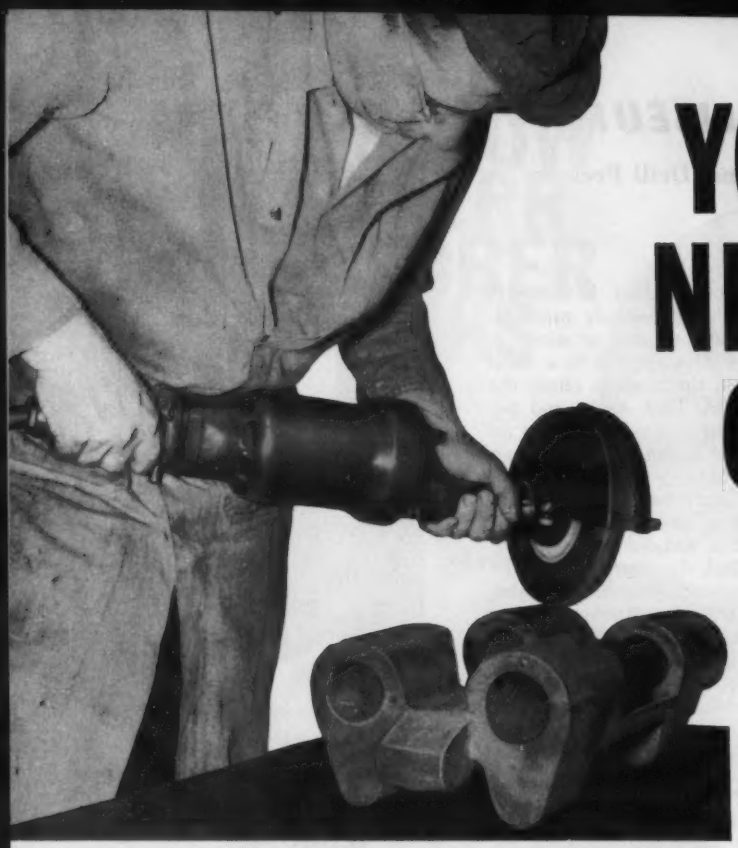
Johansson precision radial drilling machine will drill holes up to 18 inches deep



Crane Lapmaster works to tolerance of one light band and finish of 2 to 3 micro-inches





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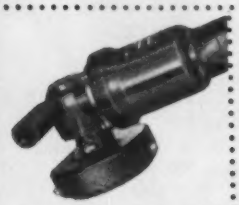

CP-550-SAG with stationary guard for rotary cup.

CP-550-SAG with revolving cup guard.

CP-550-SAS with angle sander.

CP-SAG with guard for 9" cut-off wheel or depressed center disc wheel.

CP-550-SAP with polisher.

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ON VIEW AT THE COLISEUM

South Bend Lathes, Milling Machine, Drill Presses

Booth 210

South Bend Lathe, Inc., South Bend, Ind., will exhibit a variety of machine tools and attachments. Among the equipment to be featured will be a 16-inch engine lathe, a

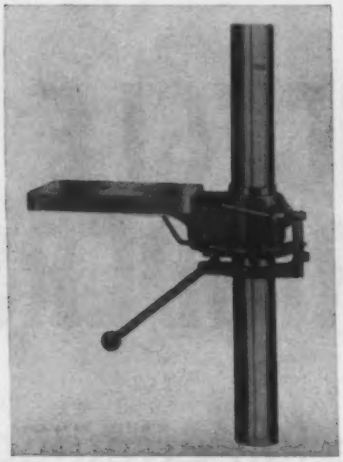


Fig. 1. Easy-Up table elevator for South Bend drill presses

13-inch turret lathe, a vertical milling machine, a 10-inch bench lathe, a pedestal grinder, a 14-inch drill press, and a six-spindle drill press. All machines will be in operation.

A new device called an "Easy-Up" table elevator, which facilitates the raising and lowering of South Bend drill press tables, is shown in Fig. 1. Although entirely mechanical, it employs no rack or screw. A pumping motion applied to a hand lever causes the table to climb the column. Table load, angle, and position around the column have no effect on the action. Exact positioning is possible.

The 13-inch turret lathe to be shown has a new, manually operated, friction spindle brake which, when applied, disconnects power to the lathe motor. This brake is also available on 13-inch engine and toolroom lathes, and can be obtained for installation on 13-inch lathes now in use.

A production drill press, Fig. 2, will demonstrate sectional tables made by the company. Through the use of multiple sections, and corresponding ends and legs, it is possible to assemble tables of any length to accommodate multiple head and column assemblies and multiple work-fixtures. End legs and inner legs have leveling bushings and pads.

The quill feed, Fig. 3, of the vertical milling machine to be exhibited has a new quick-release mechanism which frees the manual control from hydraulic back-pressure. Both a manual lever and a fine-feed handwheel are provided on the quill feed, which is infinitely variable from 0 to 25 ipm.

Circle 674 on Readers' Service Card

Twenty-inch band saw with instant speed selector

Powermatic Band Saw and Drill Presses

Booth 105

A Quik-Set instant speed selector is an important characteristic of the Model 87 20-inch metal-cutting band saw exhibited by the Powermatic Machine Co., McMinnville, Tenn. The selector incorporates a new Varidrive and two-speed transmission. Speed setting is positive and constant, and can be accomplished while the machine is running.

A complete line of accessories for

Fig. 2. South Bend sectional-table model drill press

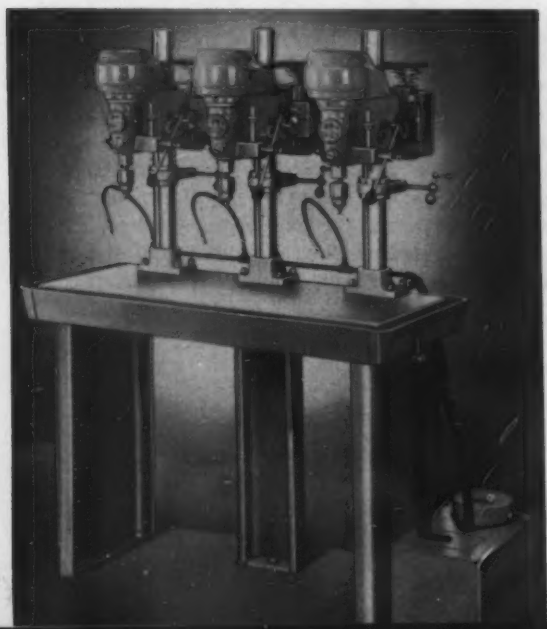
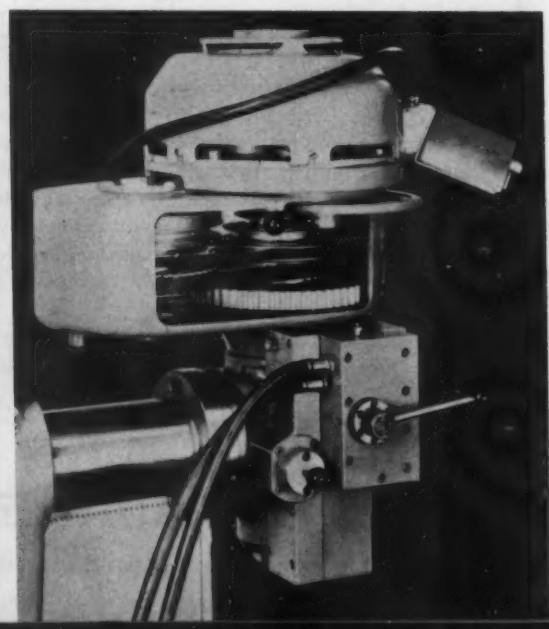


Fig. 3. Hydraulic quill feed with quick release device



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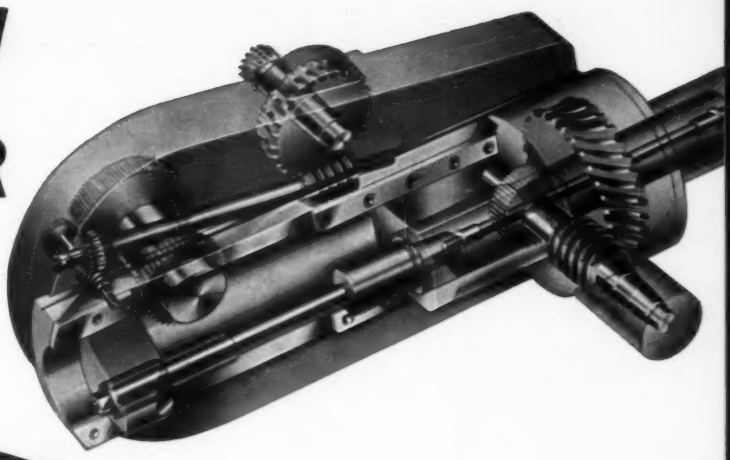
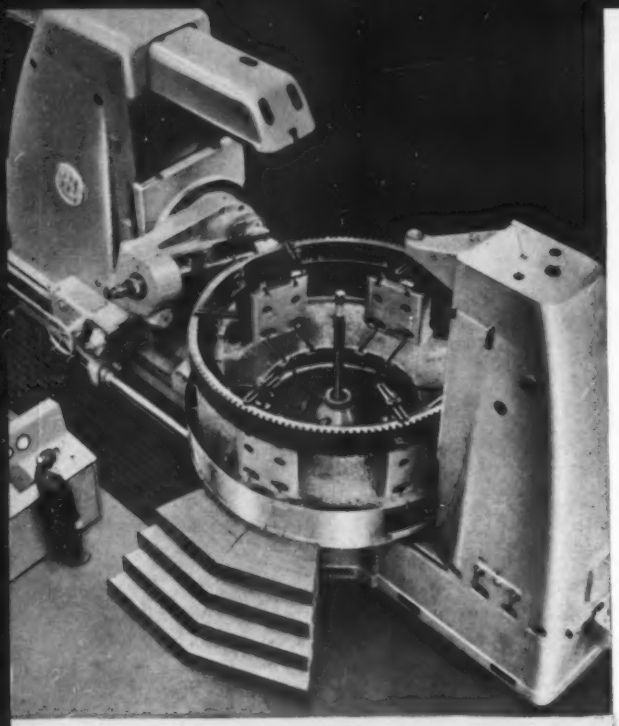


to see it at work—turn the page.....



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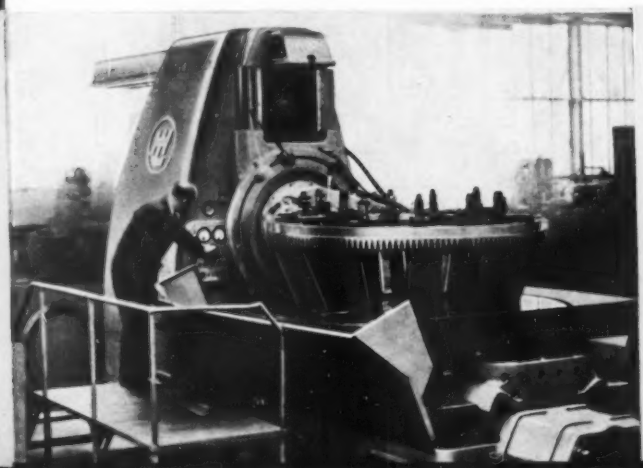
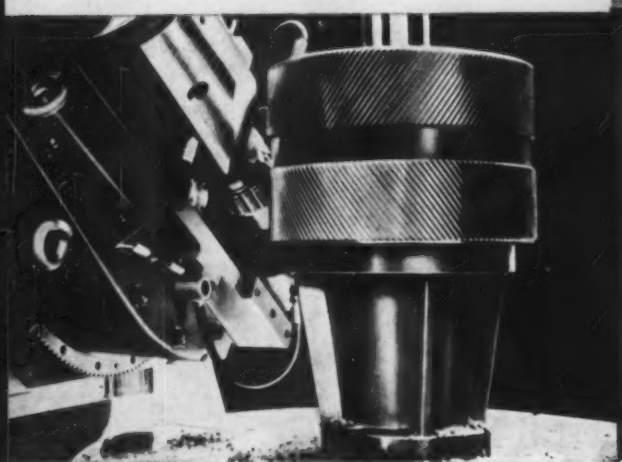
▲ Hobbing a helical ring gear on Model L-3200



▶ Hobbing a radar rim gear on Model L-1800



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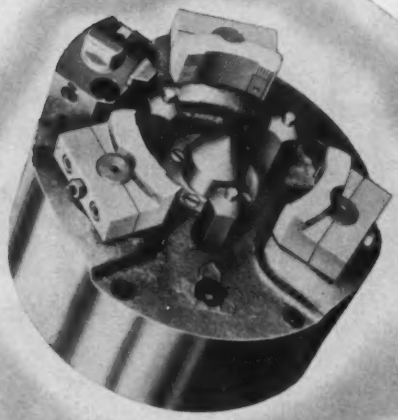
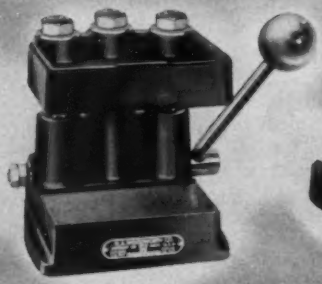
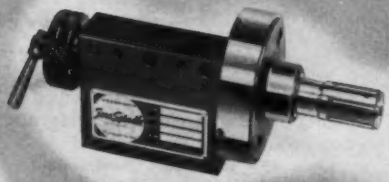


"BALL-LOK"
POWER CHUCKS

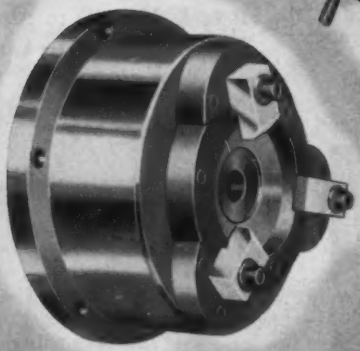


"CONE-LOK" JIGS

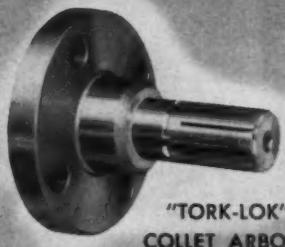
"TORK-LOK"
FIXTURES



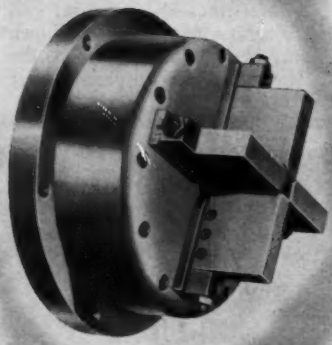
"ZERO-SPINDLE"
INSPECTION FIXTURES



UNIVERSAL CLAMPING FIXTURES
(Finger Chucks)



"TORK-LOK"
COLLET ARBORS



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For more data circle this page number on card at back of book

the band saw will be on display, including contour cutting, circle cutting, and file band attachments; chip blowers; lights; blade welders; blade guides; as well as a new series of drill presses in a variety of single- and multiple-spindle arrangements.

Circle 675 on Readers' Service Card

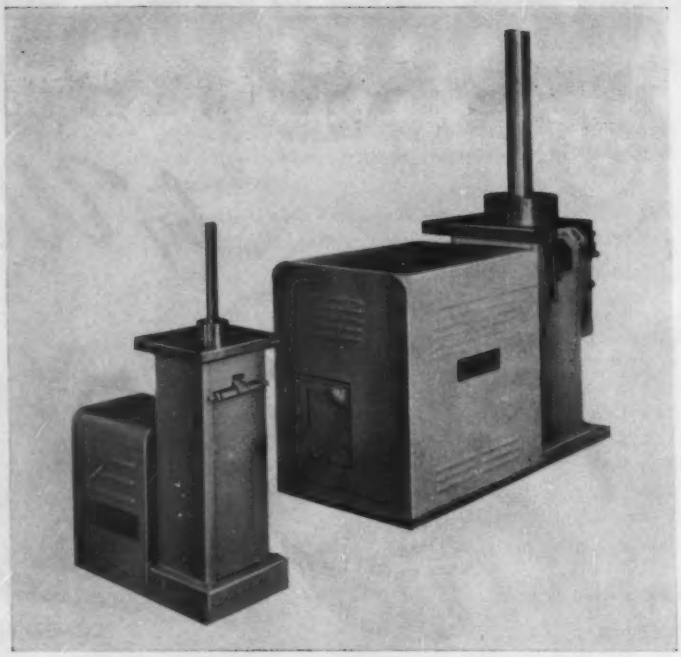
Olivetti Grinding Machines, Drill Presses, and Electric Gaging Equipment

Booth 609

The Olivetti Corporation of America, Long Island City, N. Y., will feature and demonstrate a Model R4-300P/Y 10- by 15-inch automatic production grinder. It is a fully automatic, cylindrical grinder which can be preset to grind within 50 millionths of an inch to a positive stop without in-process gaging. This small machine weighs almost 2 tons and drives a 16-inch wheel with a 4-hp motor. It includes an eight-speed automatically braked headstock. The machine ways are hand scraped and automatically lubricated throughout.

A semi-automatic universal grinding machine featuring new electric gaging equipment will also be demonstrated. Other equipment on display will be high-speed sensitive drill presses and electric gaging accessories.

Circle 676 on Readers' Service Card



Two keyseaters to be introduced by Mitts & Merrill, Inc.

Mitts & Merrill to Show Two Additions to Line of Keyseaters

Booth 320

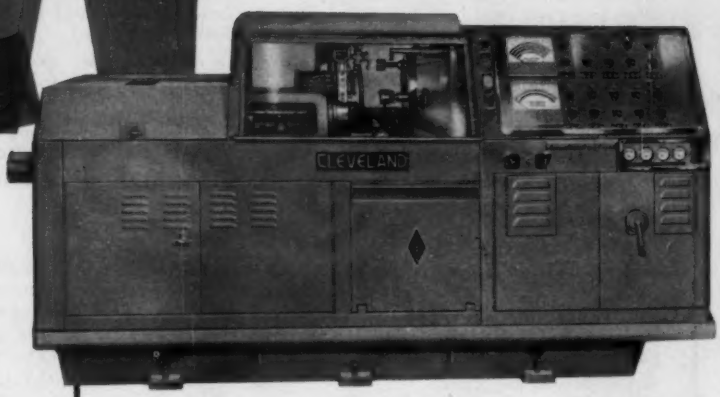
Two keyseater vertical cutting machines will be introduced by Mitts & Merrill, Inc., Saginaw, Mich. The larger of the models is the No. 6 hydraulic keyseater seen at the right in the illustration. This unit has a cutting capacity of 3 1/2 by 30 inches. It not only cuts internal keyways but, with simple fixturing, will cut splines, serrations, and die profiles, both internal and external. Infinitely variable cutter speeds, automatic feed and tool relief, and simplified operation are other features.

The second keyseater is the smaller Model No. 1 shown at the left in the illustration. It is mechanically operated and has a cutting capacity of 3 1/4 inch by 8 inches. Companion accessories, offered as options, permit both keyseaters to meet many specific requirements. These two models are additions, giving the company a complete line of keyseating equipment. The machines can be used for short-run applications in most cases where it is necessary to keep setup time to a minimum.

Circle 677 on Readers' Service Card

Olivetti 10- by 15-inch, automatic cylindrical grinding machine

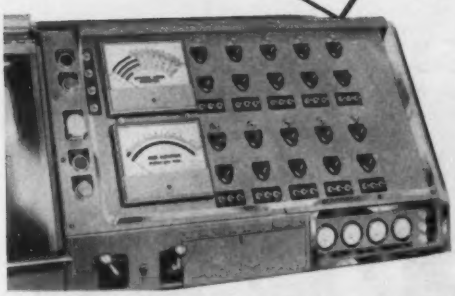
NEW 1⅝" MODEL AB CLEVELAND



SETS UP FASTER THAN ANY OTHER SINGLE SPINDLE AUTOMATIC!

With its years-ahead features, the 1⅝" Model AB Cleveland sets new high standards for speed and convenience of set-up...cuts your costs on short-run work to record new lows!

Here is the only single spindle bar automatic where you can set 10 separate, infinitely variable spindle speeds (40 to 3100 rpm), and infinitely adjustable forward and return turret tool feeds, simply by turning knobs on the programming panel. There are no change gears or feed cams involved. The precise speeds and feeds selected will repeat accurately, cycle after cycle, until changed. All other controls are conveniently located and quickly set.



EXACT SPINDLE SPEEDS AND TURRET TOOL FEEDS ARE SET WITH A TWIST OF THE WRIST!

This programming panel on the 1⅝" Model AB Cleveland contains every control necessary for setting spindle speeds and turret feeds. You simply turn the appropriate knob—one for each of five turret positions, forward and return—until the speeds and feed rates desired are indicated by the pointers of the speed and feed monitor dials.

This Cleveland gives you the capabilities of a tape-controlled machine for profitable, automated small-lot production . . . **plus** the time-saving advantage of immediate, on-the-spot feed and speed adjustments for top efficiency on every cutting operation! Full details on this years-ahead Cleveland are illustrated and described in new Bulletin No. 560. Write for your copy, or call in a Cleveland field engineer for complete information.

Write for Bulletin No. 560. See this new Cleveland at Booth No. 900, The Machine Tool Exposition.

Sales Offices: Chicago • Cleveland • Detroit • Hartford • Springfield, N.J.

CLEVELAND AUTOMATIC MACHINE COMPANY
4936 Beech Street • Cincinnati 12, Ohio

Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

For more data circle this page number on card at back of book

O'Neil-Irwin Adds to Di-Acro Line

Booths 259-265

The O'Neil-Irwin Mfg. Co., Lake City, Minn., will display additions to the Di-Acro line of metalworking equipment. They include an adjustable punch and die (described on page 179 of March MACHINERY), which can be used in any power press to perform multiple-hole punching in sheet materials, a 5-ton, open-back inclinable press, a sheet layout machine, and a power-operated leaf type brake.

The sheet layout machine, called a Hol-Lokator, is designed for use with the adjustable punch and die arrangement and makes possible quick layout of templates and stripper plates. Maximum size sheet which can be handled is 18 by 24 inches. Larger sheets can be handled in progressive steps. A 12-inch depth of throat, which enables the user to work to the center of a 24-inch sheet, is the outstanding feature of the 5-ton punch press here illustrated. The open-back inclinable construction facilitates the feeding of material to the press.

The Di-Acro box finger brake No. 24P to be shown is a leaf type power brake with a hydraulic cylinder attached to a gear rack and pinion for actuating the bending leaf. The brake, having a 16-gage capacity across a 24-inch length, is useful for small-part forming on a production basis. It is available with either a foot or hand switch which, when tripped, will actuate the machine to clamp, bend, and unclamp the material.

Other Di-Acro equipment to be displayed and demonstrated includes both hand- and power-operated models of benders, notchers, rod parters, punch presses, rollers, spring winders, and shears. Perishable tools such as single-station punches and dies, and press brake dies, will be exhibited.

Circle 680 on Readers' Service Card

Magnaflux Nondestructive Testing Equipment

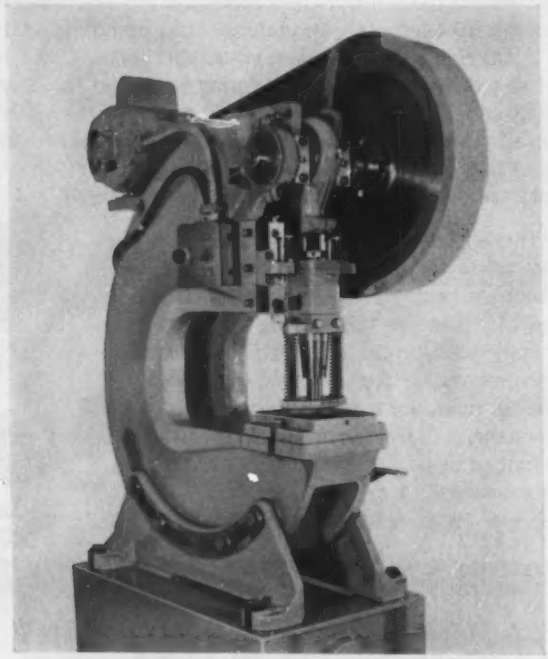
Booth 400

A feature of the nondestructive testing systems and equipment to be exhibited by the Magnaflux Corporation, Chicago, Ill., will be a Type NQ-242 magnetic particle testing unit. This unit, illustrated here, is specially equipped with a loading tray, positioning fixture, bath applicator, and an automatic magnetizing circuit for production testing of ferrous parts up to 24 inches long. Suspended magnetizing heads and coil permit the conveyor to be positioned either across or through the unit.

A portable ultrasonic thickness-measuring instrument—the fully transistorized battery-powered Sonizon SO-300—will also be shown. Designed for direct-reading, it measures thickness of steel, brass, nickel, copper, aluminum—almost any material which transmits ultrasonic sound. By simply placing a probe on the surface of the piece to be measured and rotating a dial, the SO-300 gives an instantaneous reading of thickness. Improved features include greater sensitivity, simplified controls, and easier reading.

Pressurized spray cans (12 ounces) of No. 9 Magnaflux bath and No. 14 fluorescent Magnaglo bath for use with any of the Magnaflux-Magnaglo kits and units will be displayed. With the use of these cans, areas to be tested are quickly saturated with the proper mixture of oil and magnetic particles. The need for mixing and special spraying devices are eliminated. Throw-away squeeze-type dispensers of No. 1 Magnaflux gray powder are also available.

An automatic eddy current sorting instrument, the Magnatest FS-310, will be demonstrated with integrated parts feeder and a two-way auto-

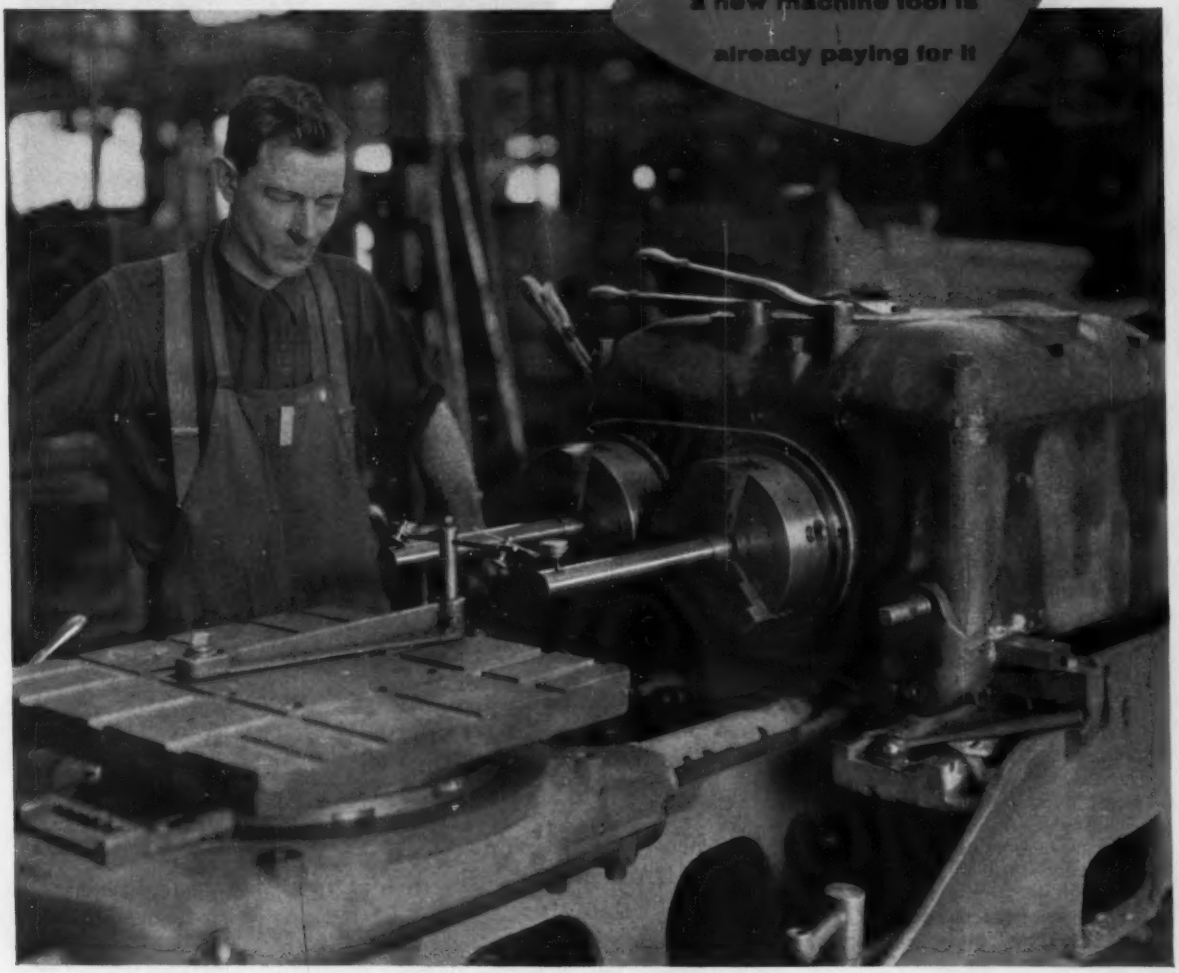


Di-Acro open-back, inclinable press with 12-inch throat to be introduced by O'Neil-Irwin Mfg. Co.

Magnaflux testing unit with automatic magnetizing circuit. This is designed for parts up to 24 inches long

JONES & LAMSON MACHINE COMPANY

the man who needs a new machine tool is already paying for it



It's Useful . . . but is it still Profitable?

Provide competent people with the proper equipment, and you have the key to sustaining a sound, healthy business condition.

Incompetence in people is detected sooner than later, and they are replaced. It's the value of the equipment that fools most of us. Just because a machine still runs, possibly as well as when new, it's generally considered as useful. But it's not *usefulness* that brings home the bacon — it's *profitableness*.

New, improved methods, and the machines to implement these methods, are being created constantly. If your methods and equipment do not stay abreast of competition, at the least, you inevitably will be out-produced, out-priced, and out of business.

Most of the really good new machine tools now available to industry will pay for themselves in a short time, and will roll up profits besides. We think this is true for some other makes of machines — and we *know* it is true for each and every item in the complete line of Jones & Lamson equipment.

J & L machines are easier to acquire than you may think, too.

Investigate the new J & L Profitivity Lease Plan. It requires no money down, no advance payments — in fact, no payments of any kind are required until thirty days after the machine has been shipped.

Write to Jones & Lamson Machine Company, 512 Clinton Street, Springfield, Vt. for Machine Replacement and payment plans.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

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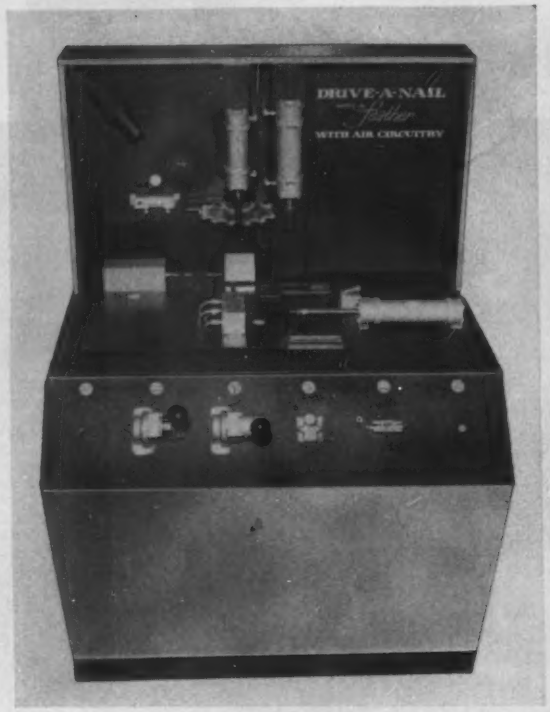
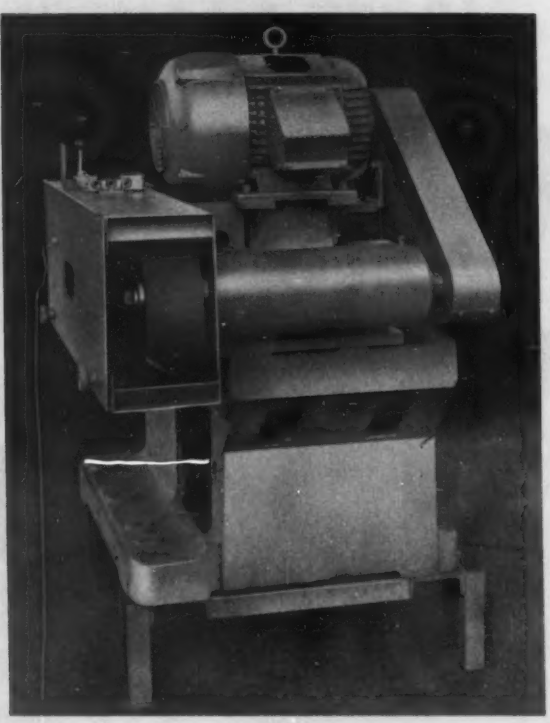
NEW PRODUCTS AT THE NAVY PIER



Westinghouse Air Brake's operating display demonstrates advantages of pneumatic devices in sequenced operation



Heavy-duty abrasive-belt grinding attachment by Production Machine Co. for use on lathes, mills, and planers

matic sorting gate. Symetrically shaped parts may be segregated according to such properties as hardness, alloy variation, and heat-treat condition. An acceptable part is placed in one coil and used as a reference. All other parts pass through the test coil which senses variations from the reference part. An electronic switch activates the automatic sorting gate.

Circle 681 on Readers' Service Card

Westinghouse Air Brake Demonstrates Advantages of Air Circuitry

Booth 301

An operating display will be set up at the booth of the Industrial Products Division, Westinghouse Air Brake Co., Wilmerding, Pa., to show a few of the functions accomplished with air controls. In the demonstration will be unique multiple-position air cylinders and seven different types of directional air valves which are combined into an air circuit with safety interlocks and various other types of controls. An eight-penny nail will be driven into a solid 4-inch square wooden block by the touch of a feather after the block has been maneuvered into any one of twenty different positions.

Circle 682 on Readers' Service Card

Abrasive-Belt Grinding Attachment

Booth 410

Production Machine Co., Division of Wanskuck Co., Greenfield, Mass., will exhibit a newly designed abrasive-belt grinding attachment built for mounting on heavy-duty lathes, mills, planers, and other machine tools in horizontal, vertical, or angular positions. The unit is capable of heavy stock removal, close size control, and fine finishing. Standard models can be furnished with either a right- or left-hand assembly. They use a 12-inch diameter contact wheel and will accept abrasive belts up to 4 inches wide and 86 inches long. Belt tension is maintained by an air or hydraulic cylinder; tracking control is within easy reach of the operator.

Circle 683 on Readers' Service Card

Sunnen Service Corporation Gaging Equipment

Booth 327

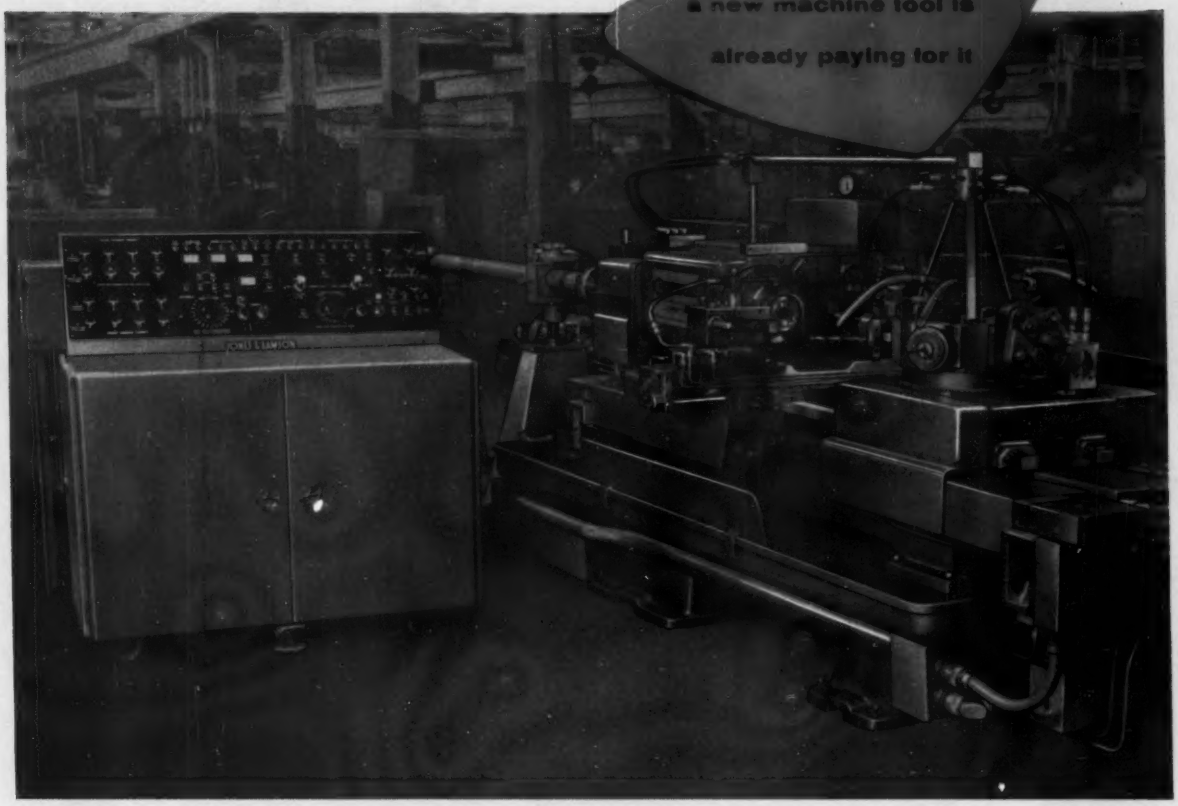
A precision bore gage (Fig. 1) and size-setting fixture (Fig. 2) combination will be featured by Sunnen Service Corporation, St. Louis, Mo. Made by Sunnen Products Co., and leased through the Sunnen Service Corporation, this combination re-

Fig. 1. Sunnen Service Corporation precision hole gage

JONES & LAMSON

"AUTOMATION"

the man who needs a new machine tool is already paying for it



New numerically-controlled turret lathe shatters idle time . . . is ideal for short runs

At the last Machine Tool Exposition, five years ago, Jones & Lamson exhibited an automatic tape-controlled turret lathe. It created a sensation and attracted thousands of fascinated spectators. Many of them wanted to buy. But the machine wasn't for sale. Why? Because there were still "bugs" in it to be ironed out, and our reputation is too valuable to risk on an "almost" product.

In the five years since, J & L still kept this lathe off the market, pending its complete development and proving-out. Now, it is ready to be shown, ready to be sold, ready to help you attain new production efficiency.

The new J & L numerically-controlled turret lathe is a complete redesign job. The sound features of the early prototype have been retained, and all question marks have been eliminated. In every way, this is a real beauty!

It's designed especially for short run production and top economy. It has the capacity of a No. 5 machine, 2¼ x 24 in., and has three turrets (one hexagon and two square) which accept up to 14 preset tools. A set of tools plus the tape can be "packaged", ready for set-up when needed.

This lathe can be set up as either a bar machine or a chucker, in 10 to 15 min. It positions within .001″, repeats to .0005″. Drive motor is 30 HP, with spindle speeds of 40 to 2000 rpm in 24 steps. Feed rates for carriage and saddle are .750″ to 30.0″ per minute in 16 steps, plus fast motion. Cross-slide operates at one-half these rates. Tape input information may be adjusted for extended tool life and size control by manual dials on the control panel. Productivity is increased 25 to 30% over standard cycle time. Even the automatic bar feed is programmed from the tape. See it at Chicago, or write for advance information now. Jones & Lamson Machine Company, 512 Clinton Street, Springfield, Vermont.

Turret Lathes • Automatic Lathes • Tape Controlled Machines • Thread & Form Grinders • Optical Comparators • Thread Tools

For more data circle this page number on card at back of book

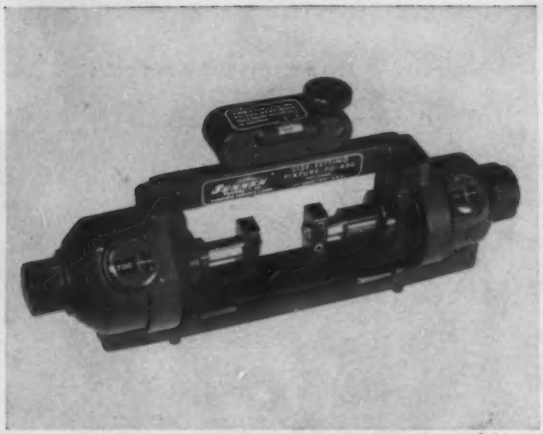
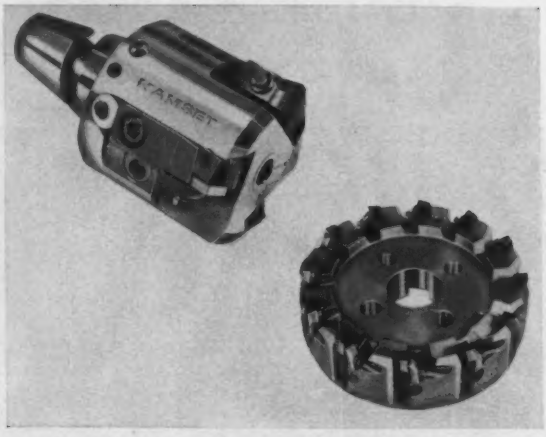


Fig. 2. Size-setting fixture to be used with gage illustrated in Fig. 1



Kamset cutter (top) which permits instantaneous adjustment, and Valenite throw-away insert milling cutter (bottom)

quires no gage blocks, rings, or other masters for setting, and can be used to check or gage any hole within 0.375 to 2.900 inches. Settings are as simple to establish as micrometer readings and entirely independent of operator "touch." The gage is portable, self-contained and built for shop use. It has a full-floating reed type mechanism, employing no racks or gears. A 1000:1 magnification allows it to be read to 0.000025 inch. The indicating needle moves one inch across the linear scale of the gage for a 0.001 inch diameter variation.

Circle 684 on Readers' Service Card

Valenite Metals to Show Throw-Away Insert Tools

Booth 627

The Valenite Metals Corporation, Royal Oak, Mich., will feature throw-away insert tooling at the Show. Among the new tools to be exhibited is a Kamset boring cutter which utilizes throw-away inserts. It features a setup adjustment to control each insert independently, and permits simultaneous adjustment of the inserts during a production run.

Also displayed will be a complete line of throw-away insert holders with adjustable chipbreakers, the V.M.U. system of tooling, and a new throw-away insert type of milling cutter. Most of the tools will utilize the cartridge principle. A prominent feature of the display will be case histories of unusual applications of throw-away insert tooling.

Circle 685 on Readers' Service Card

Theme of Engis Exhibit: "Analytical Metrology"

Booth 467

"Analytical metrology for the machine, the tool, and the work" will be demonstrated by Engis Equipment Co., Chicago, Ill. Included will be advanced optical, interferometric, photoelectric, and electronic tools for machine tool control, alignment, length measurement, automatic leveling, surface inspection, and control of work-piece geometry. There will also be a demonstration of fundamental standards of measurement in the fields of length, angularity, circular division, magnification, roundness, and surface roughness.

A section of the booth will be devoted to metrology calibration equipment and special educational and informative material. Among the equipment to be shown will be: an improved compact Talyvel automatic level with variable sensitivity of 1 to 20 seconds, Fig. 1; the new

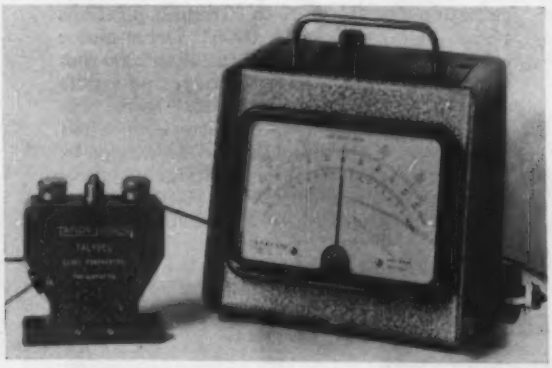


Fig. 1. Improved Engis Talyvel automatic level

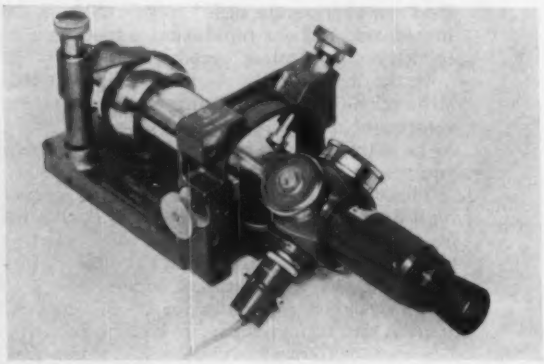
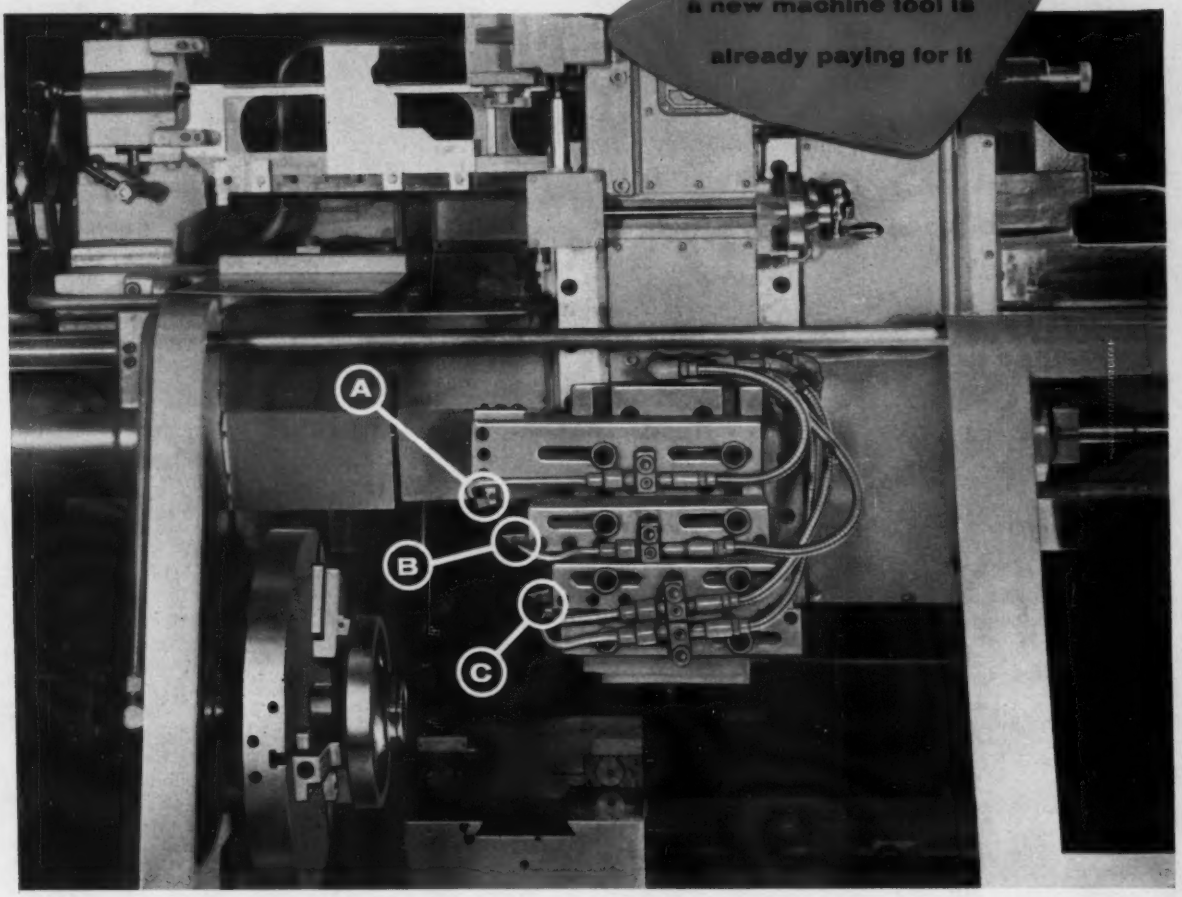


Fig. 2. Engis Micro-alignment telescope has auto-collimation

JONES & LAMSON MACHINE TOOLS

the man who needs a new machine tool is already paying for it



Multiple Tool for a Fully Automatic Two-Dimensional Tracing Cycle

The two-dimensional tracing slide on the new Jones & Lamson Model 30 Automatic Tracing Lathe provides a new opportunity for multiple tooling on tracing operations. In addition, this slide offers eight different tracing cycles for tool motion — each of which controls tool travel through a full 180° of motion.

Automatic speed and feed changes during a cut allow for the proper cutting speeds on varying diameters, resulting in longer tool life, better cycle time, and desired surface finish. *For Example:* The illustration above shows the machine as it is tooled up for one of a variety of sizes of gear blanks. Three tools on the tracing slide machine the various surfaces of the blank in one completely automatic cycle. Tool "A" approaches the work first. It chamfers and turns the O.D. At the end of the turn, tool "C" is in position to chamfer and face the contour of the hub. As this is completed, tool "B" faces the piece, contours the large radius at the flange and faces the flat surface at the face of the gear blank O.D. Automatic speed and feed changes may occur as each tool is engaged.

Multiple tooling of tracing operations not only shortens tracing cycles, but also offers the opportunity for proper tool geometry for each particular phase of the operation. Set-up from one job to another is accomplished in a matter of minutes by graduated dog rings on the conveniently located control drum.

You can see this machine in operation at the NMTBA Exposition, Booth #839, in Chicago. Or you can get detailed information now by writing for Catalog No. LO-6011. Jones & Lamson Machine Company, 512 Clinton Street, Springfield, Vermont.

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Fig. 3. Master inspection instrument checks accuracy of optical tooling

micro-alignment telescope (Fig. 2) with auto-collimating and direct reading to 0.0002 inch, equipped with projection and camera attachments; a unique compact test and calibration fixture for optical tooling instruments, Fig. 3; machine tool scales and projectors with sealed, built-in zero-setting arrangement to 0.0001 inch; and Auto-Set with micrometer reading.

Circle 686 on Readers' Service Card

Bending Presses and Tube-End Finisher Draw Lively Interest in Pines Exhibit

Booth 266-268

"Seven Ways to Save in Bending Operations," will be the theme of the show exhibit of the Pines Engineering Co., Inc., Aurora, Ill., A total of five machines will be demonstrated on simulated production operations. Model 5-T bending press (Fig. 1), on display for the first time, handles tubular and certain shapes of structural stock. Production jumps 25 to 50 per cent because a pair of tubes is bent with each press stroke.

With its additional bending capacity, the 5-T handles work in the heavier and larger areas beyond the capacity of smaller presses. It can handle two 1-inch outside diameter by 0.065-inch (16-gage) steel tubes, simultaneously making one bend in each tube. The machine is ideally suited for the single or multiple bending of "U" frames, "Z" shaped side frames, or other two-bend parts.

The air-operated version of Model 660 tube-end finishing machine, Fig. 2, will be displayed for the first time. Authentic air operation with pedal control frees both of the operator's hands and permits production speeds up to 1500 ends an hour. With a capacity to 2-inch diameter, this self-contained, bench-mounted machine is ideal for general shop use.

Representing the Pines line of twelve sizes of rotary benders, Model 2 will be in operation bending a part formerly produced by forging. In this operation a solid steel bar is bent with extreme accuracy, proving another cost-reducing application for the company's bending method. The part, a multiple-throw crankshaft for farm equipment, is held to within plus or minus 0.030-inch over-all tolerances. Hydraulically operated, machines in this line are widely used in the bending of tubing, pipe, rod, bar, and extruded or rolled shapes up to 2-inch IPS heavy pipe.

Circle 687 on Readers' Service Card

(This section continued on page 332)

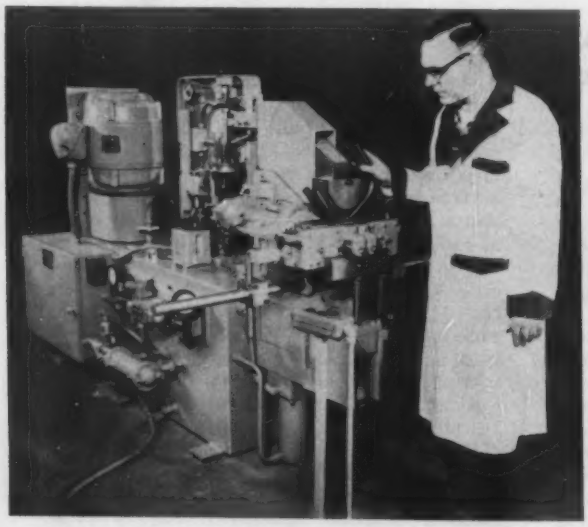

Fig. 1. (Left) Tube-bending press forms two tubes with each stroke, attaining rates up to 1800 bends an hour

Fig. 2. (Right) Air-operated end-finishing machine frees operator's hands for loading and unloading the tools

JONES & LAMSON OPTICAL COMPARATORS

the man who needs a new machine tool is already paying for it

J & L Optical Comparator is a production tool

At John Hassall, Inc., Westbury, L. I., nails, screws, rivets, fasteners, and other small parts are "Job-Designed" to satisfy the customer whose requirements cannot be adequately met by the standard item.

Rigid AN (military) specicfiations are strictly adhered to whenever required. In all cases, the Jones and Lamson Optical Comparator has become an almost indispensable production tool.

In the cold heading process used at Hassall, the J & L Comparator acts as a monitor for controlling the essentials of the production process. *Tools* for manufacture of dies are checked for proper cutting edge and angle. *The dies* themselves are checked for cavity contour and angle by taking plastic impressions. *Finished parts*, accurately magnified 10 times under the critical eye of the Comparator, are checked at a glance for tolerances. But, even more importantly, this inspection gives essential information as to when and where dies may be worn, or where other areas of the *manufacturing process* should be changed. How easy it is for production control and tolerance requirements to be maintained!

J & L Comparators, featuring magnifications up to 250X are ready to go to work for you. Write for literature. Jones & Lamson Machine Company, 512 Clinton St., Springfield, Vermont.

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New Magnetic Sub-Base for Heavy-Duty Milling

Daniel F. Gotha, Chief Engineer, O. S. Walker Company, Inc., Worcester, Massachusetts

The benefits of using modern cutting tools and new, high speed, more powerful milling machines are often limited to relatively few hours per day because of the time spent in loading, unloading and changing setups. This often raises the cost per hour of a machine to such a high point that purchase and replacement of obsolete equipment is postponed. To help the metalworking industry to minimize the down time of expensive heavy duty milling machines, the O. S. Walker Co., Inc. has developed a new line of magnetic sub-bases specifically designed for versatile holding, both magnetic and mechanical, on large milling machines.

The conclusion that the sub-base would have to be adaptable to both magnetic and mechanical holding was arrived at to eliminate the necessity of removing the magnetic sub-base when a part is not adaptable to magnetic holding. To achieve this end, the top plate is one piece steel construction with T-slots and planer stop holes for horizontal positioning and blocking. The one piece steel top also assures maximum strength and rigidity.

Special Magnetic Design

With the above thoughts in mind, our engineers at O. S. Walker Co., Inc. evolved a special magnetic design that produces an extremely powerful magnetic field yet is controlled so that magnetism does not escape through the bottom of the sub-base to cause magnetization of the machine table and ways. This eliminates one of the causes of excessive wear of ways, level screws, nuts.

The powerful magnetic field permits the use of raised blocks and shims to extend the use of magnetic holding to irregularly shaped work pieces. When working thinner pieces, such as textile loom sides, shims may be used to locate the work properly with reference to the sub-base top. Magnetic holding when used in this manner eliminates the distorting stresses to which the same work pieces are subjected when clamped mechanically. The use of the magnetic hold down force of the sub-base in conjunction with mechanical blocking to take up excessive lateral thrusts makes possible many time-saving setups not heretofore possible.

Low Heat Circuitry

In the new Walker sub-bases low heating is achieved through the use of a well-balanced circuit in conjunction with a low current electrical system. The I^2R power loss which causes heating is kept to a minimum by using a low current circuit which is designed to provide an extremely strong magnetic field.

for New Machines...

Walker CERAMAX RECTANGULAR CHUCKS

Check these advantages of Ceramax Chucks —

- Holding power extends to periphery of chuck.
- Silver brazed all-steel top plate.
- No magnetism imparted to work; chips and grit fall freely from work surface.
- No soft gap strips in which chips become imbedded — eliminates constant redressing.
- Three times coercive force of ordinary Alnico magnets.
- ¼" pole spacing.
- Low in height for greater machine capacity.
- Sizes from 4" x 4" to 12" x 24".

NO MATTER HOW COMPLEX YOUR PROBLEM

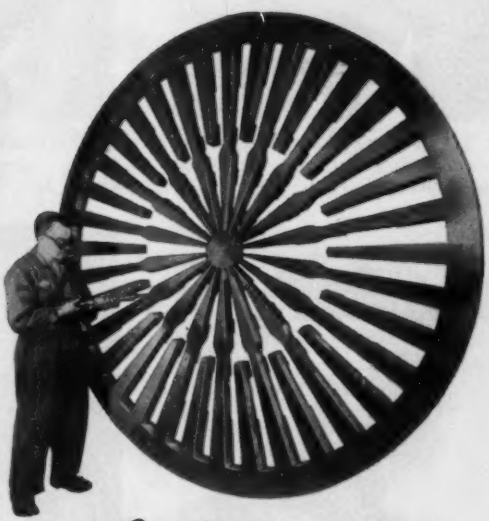
Walker has the know-how to solve it!

Here are three typical instances of how O. S. Walker, can solve unusual problems for customers.

Above — A large three faced electro magnetic chuck measuring 13½" x 22" x 158" especially built for the knife grinding industry.

At right — A 96" diameter rotary auxiliary plate being prepared for production.

Above — An example of Walker engineered demagnetization — a special Saturable Reactor Control Demagnetizer for ball bearings.



O.S.Walker

O. S. WALKER CO. INC., WORCESTER, MASS.

Original Designers & Builders of Magnetic Chucks

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Men Responsible for Results in the Machine Tool Using Industries

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B. F. Miller, Vice-President, Operations, The Ohio Injector Company, Wadsworth, Ohio.

A. Edwin Carter, Vice-President, Manufacturing, Worthington Corporation, Harrison, N. J.

R. L. McGinnis, General Superintendent, International Harvester Co., Emeryville, Calif.

G. C. French, Jr., Vice-Pres., Centralab Electronics Div., Globe-Union Inc., Milwaukee, Wis.

Harold R. Laubach, Mgr., Mfg., Allison Division, General Motors Corporation, Indianapolis, Ind.

Leonard C. Bowen, Vice-President, Manufacturing, Underwood Corporation, Hartford, Conn.

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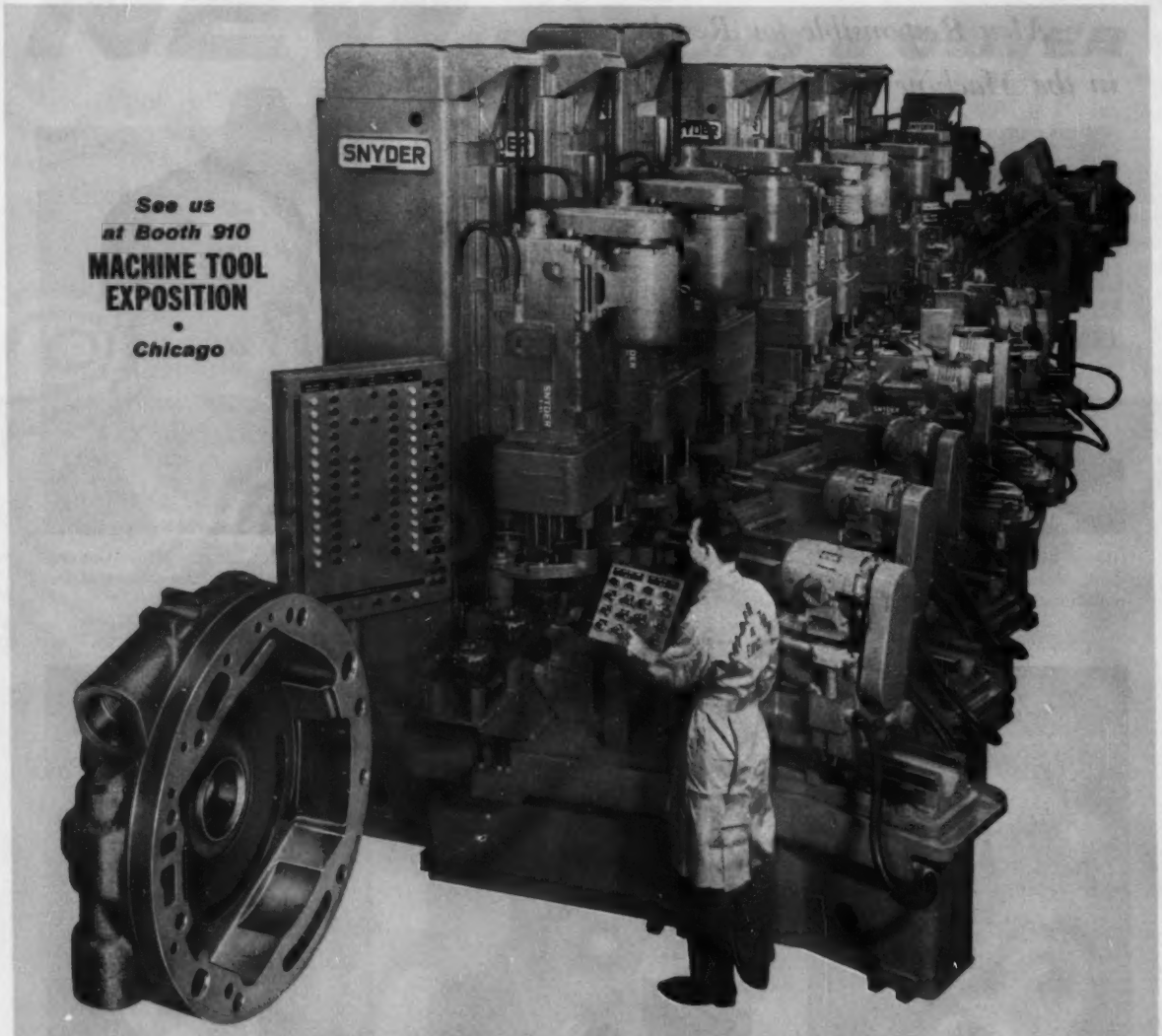
John E. Brennan, Vice-Pres. & Dir. of Mfg. Staff & Services, Chrysler Corp., Detroit, Mich.



SNYDER BUILDING-BLOCK PRINCIPLE MAKES TRANSFER MACHINES VERSATILE, CONVERTIBLE, THRIFTY

Transfer machines built up on the "building-block" principle are old stuff at Snyder and we've built all kinds of them—including the ones that turn corners and bring the part back to where it started from, processed from half-a-dozen angles, gaged, probed, automatically inspected in process, washed and dried and rejects marked for re-processing. Nothing to it if that's what the job calls for. We call it the Snyder Building-block Principle.

Here's an example of a fairly simple Snyder building-block transfer. This 58 station machine performs 74 operations on an automatic transmission pump body, drilling, reaming, tapping, gaging and probing 180 parts an hour at 100% efficiency. Any or all of its 22 segments can easily be converted to perform comparable operations on other parts. Also, the number of segments can be reduced or increased at any time, as need dictates. Your inquiries are invited.

SNYDER
CORPORATION
(Formerly Snyder Tool & Engineering Company)

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F. J. Durzo, Vice-Pres. in Chg. of Manufacture, The Jeffrey Manufacturing Co., Columbus, Ohio.

Drilling Super-Strength Alloys

Successful drilling of the difficult-to-machine, super-strength alloys depends upon a number of factors. These factors have been analyzed and listed in a recent issue of "Metal Cuttings," a publication of the National Twist Drill Co. and Winter Bros. Co., as follows:

1. A rigid drilling setup with a smooth drill drive must be used.

2. The drill should have the shortest possible flute length.

3. The drill should have of course the shortest possible over-all length.

4. The drill should be of heavy-web construction with the smallest flute area consistent with satisfactory chip ejection.

5. The drill helix angle should be reduced as the work material becomes more difficult to drill. However, the highest helix angle consistent with adequate cutting edge strength should be used to improve cutting efficiency.

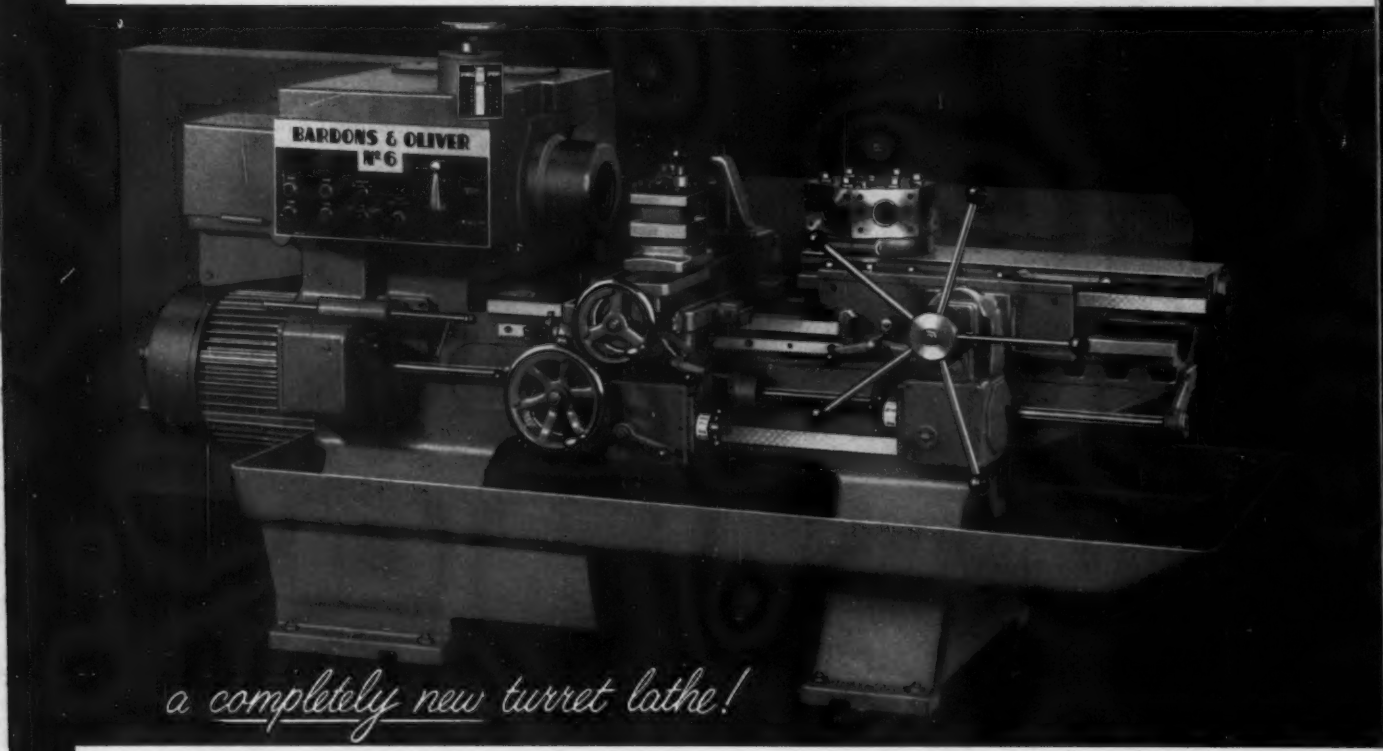
6. The drill material should have the highest possible hardness consistent with tool and setup rigidity. Highly alloyed super high-speed steels may be helpful with rigid setups. When carbide drills are necessary, exceptionally good operating conditions are required.

7. Hard case surface treatments should be used on the larger diameter drills made of conventional high-speed steels.

8. With most super-strength alloys a black-oxide surface treatment applied to the drill will minimize galling.

NEW BARDONS & OLIVER No. 6
RAM TYPE TURRET LATHE

- 3 INCH COLLET CAPACITY FOR HEAVY DUTY BAR WORK
- 5 INCH COLLET CAPACITY FOR LIGHT DUTY BAR WORK
- 21⅛ INCH SWING OVER BED WAYS



a completely new turret lathe!

New bed, headstock, tool carrying units and aprons are properly proportioned and integrated to produce a truly functional lathe. It offers greater metal removal capacity, while holding today's most demanding tolerances!

In the design of this lathe, the operator was not overlooked. The number of operating controls has been reduced — grouped by function—scientifically located within easy reach. Generous use of aluminum and redistribution of weight results in improved balance and freer traverse of tool carrying assemblies.

For more information on how the new No. 6 can speed up your machining operations and build increased profits, contact the nearest Bardons & Oliver representative or write directly to our home office.

Bardons & Oliver, Inc., 1133 West 9th Street
Cleveland 13, Ohio

NO. 6 FEATURES

- Sixteen Geared Spindle Speeds—50 to 1 speed range
- Constant Horsepower (optional to 30) at all spindle speeds
- Fully Automatic spindle speed changes
- Twelve Fast Food Changes for cross slide, carriage and hexagon turret
- Single Dial Food Selectors on both aprons
- Power Rapid Traverse to the cross slide

BARDONS & OLIVER

MACHINE TOOL EXPOSITION MMT=PE BOOTH 741

Stop in at our booth and see the new No. 6 in action.

Manufacturers of Turret Lathes and Cutting-Off Lathes

Companies Whose Exhibited Products Are Described in this Issue

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Dial "Engraved" on Milling Machine

H. J. GERBER, Stillwater, Okla.

Graduations can be "engraved" around a dial by using a milling machine equipped with a simple dividing fixture, shown in the accompanying illustration. Here, one hundred and twenty-five divisions are being cut on the beveled face of the dial.

The fixture is a free-turning spindle, supporting the dial at one end and an indexing plate at the other end. It is mounted on an "A" base so that the beveled face is parallel to the machine table. The indexing plate has one hundred and twenty-five notches, each of which is successively engaged by a spring-loaded plunger.

For the engraving, a tool-holder carrying a single-point cutter is clamped to the milling machine arbor. The arbor does not revolve: it merely serves to support the tool-holder. For each graduation, the indexing plate is rotated one notch and the machine table is fed a short distance. Lines cut on the face of the indexing plate indicate to the operator which graduations are to be made as short, medium, or long lines on the work, and he feeds the machine table the required distance.

The indexing plate has the same number of notches as the number of lines to be engraved. For each line, the table is fed and retracted, and the indexing plate is rotated one notch.

AT DEVLIEG BOOTH 431 • NMTBA EXPOSITION

new series

"Designated the model 'H,' our new Jigmil series provides greater range, is more rugged, easier to operate and more accurate."

"Available in spindle sizes ranging from 3" to 5", the new 3H, 4H and 5H machines greatly increase JIGMIL range for precision boring, milling, drilling and other operations. The new series introduces simplified controls, thermal control of main spindle bearings for increased accuracy . . . wider bed and table for added stability and working range . . . stainless steel way covers for positive protection . . . features that reach a new standard in JIGMIL accuracy, ruggedness and simplicity of operation. And like all JIGMILS, the 'H' series is available with the DeVlieg Diatrol direct dial dimensioning system or Tapac* —DeVlieg's own system of automatic tape control."

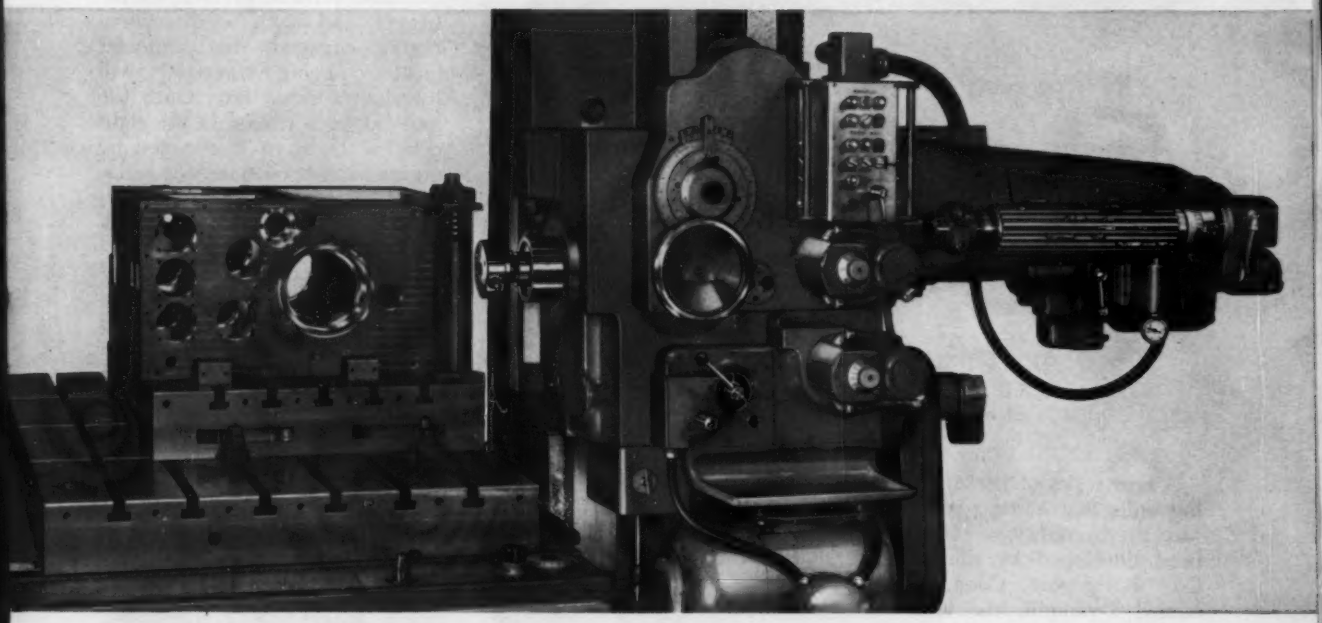
R. A. JERUE
Vice President in Charge of Engineering

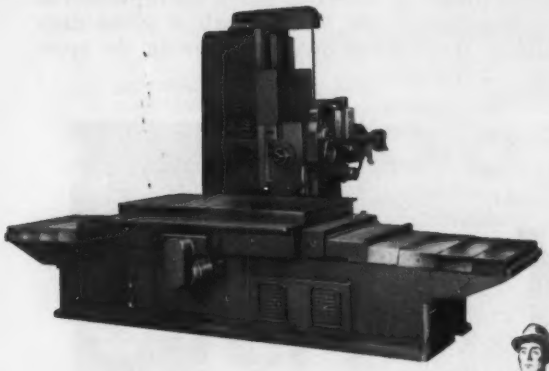
**Tape Automatic Positioning And Control*

DEVLIEG MACHINE COMPANY, FAIR STREET • ROYAL OAK, MICHIGAN

"H" Jigmils®

with Duplitrol • Diatrol • Tapac





Rewarding revelations in automatic precision await your next visit to Fair Street

NMTBA

See new "H" series JIGMILS with DeVlieg Diatrol and DeVlieg Tapac in operation at the NMTBA Exposition, Chicago, September 6-16th.

Also, see in operation the new Micropoint Precision Tool Grinder—first grinder capable of absolute control of tool geometry.

DeVlieg

SPIRAMATIC JIGMILS®

ACCURATE HOLES AND FLAT SURFACES IN PRECISE LOCATIONS

Bullard Horizontal Boring Mill and Variable-Speed Drive

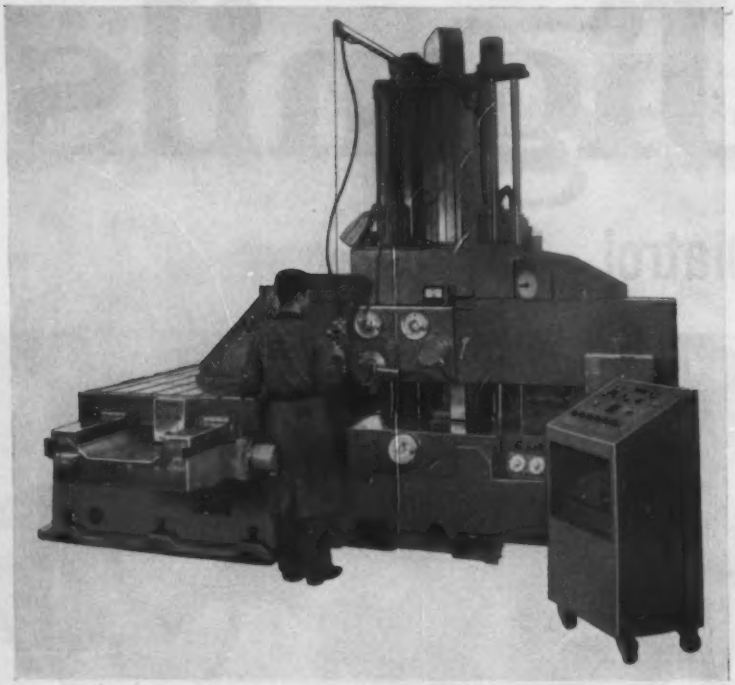


Fig. 1. Bullard Dynamill features two-finger operation by means of a pistol-grip type of pendant control

A new series of horizontal boring mills that can be controlled, literally, by only two fingers has been developed by the Bullard Co., Bridgeport, Conn. Trade-named Dynamill, the new machine (Fig. 1) is available in 3-, 4-, and 5-inch spindle sizes. It can be supplied in five standard table sizes ranging from 36 by 60 inches up to 60 by 132 inches; in five standard bed lengths from 60 to 144 inches; and in four ranges of vertical head travel from 50 to 86 inches.

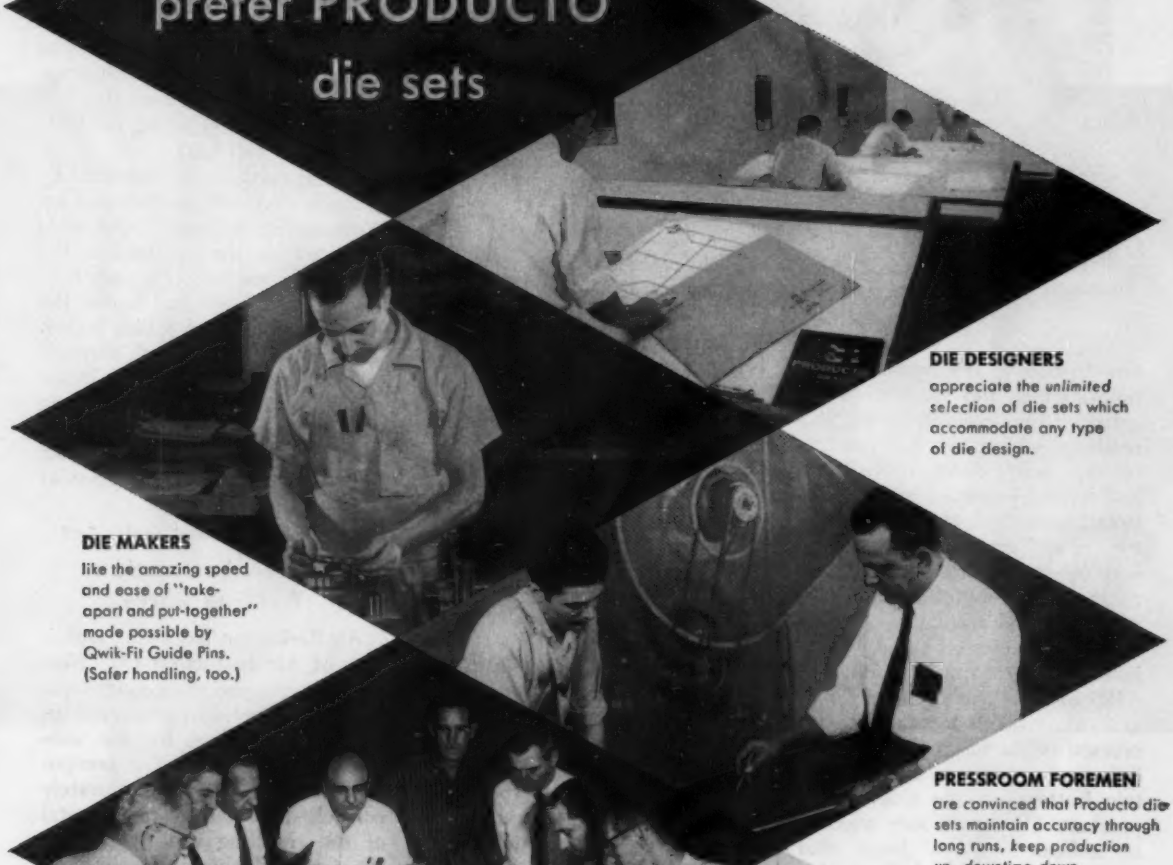
A number of new features are offered for the first time on a horizontal boring machine. One of these is the provision for positioning the work and the tool by means of clock type dials and variable traverse rates controlled through a pendant. The single pendant, Fig. 2, has a pistol grip and provides two-finger control over all traverse and feed motions of head, spindle, table, and saddle. It has a rotating turret mounting four buttons that control all directions of movement of head, table, saddle, and spindle. In one position of the turret, with the buttons at 3, 6, 9, and 12 o'clock, they will actuate, respectively, movement of the head, up; table, right; head, down; and table, left. By rotating the turret 45 degrees, four different movements are actuated: spindle, retract; saddle, advance; saddle, withdraw; and spindle, extend.

Speed of traverse and engagement of the feed are controlled by pulling or pushing a trigger on the pendant. The operator can select from four traverse rates, in direct proportion to the amount of finger pressure. With no pressure on the trigger and with a directional button engaged, the particular member being traversed will travel at a creep rate. Once the tool has been placed in the right position, the feed is engaged by pushing the trigger until it locks. The feed can be instantly disengaged by pulling the trigger back to the neutral position.

Dynamill provides a series of large, clock type dials located in plain sight of the operator at his normal control position. They can be read rapidly to an accuracy of 0.0005 inch. Location of the head, table, saddle, and spindle is each indicated by a separate, three-pointer, two-scale dial reading from 100 inches down to 0.001 inch. A red pointer on the outer dial makes one revolution in 0.100 inch; a black pointer on the outer dials makes one revolution in 10 inches; and a black pointer on the inner dial makes one revolution in 100 inches. Each of these dials can be reset, allowing the oper-

Fig. 2. Pistol-grip pendant has rotating turret to control movement of head, spindle, table, and saddle

...they all prefer PRODUCTO die sets



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like the amazing speed and ease of "take-apart and put-together" made possible by Qwik-Fit Guide Pins. (Safer handling, too.)

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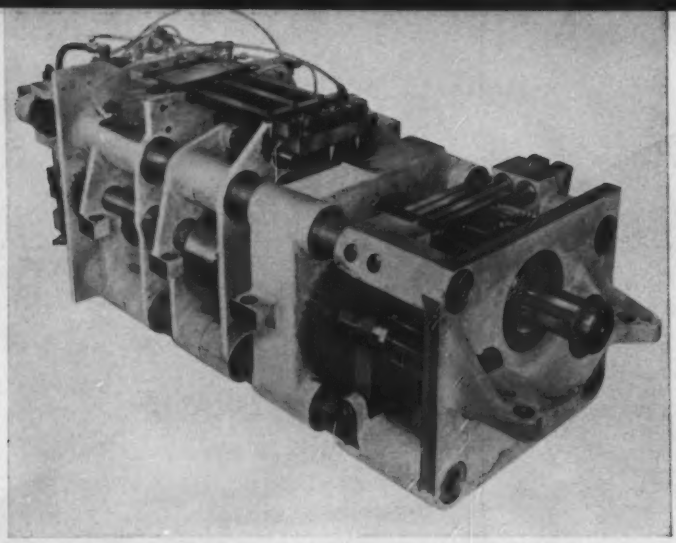


Fig. 3. Variable-speed drive is infinitely adjustable under full load, and without being stopped

ator to choose any zero-reference point. Head and table dials are actuated by precision racks, give readings which are independent of the screw-drive mechanism, and have a repetitive accuracy of 0.0002 inch. With this new power-control and accurate dials system, verniers and end measures are not required, thereby eliminating the need for hand cranks.

The Dynamill has infinitely variable feed rates ranging from 0 to 0.125 ipr and from 0 to 108 ipm, and may be increased or decreased while the tool is cutting. Spindle speeds are selected by two buttons on the side of the pendant. The speed rate selected is indicated on a large dial mounted on the head. Once this speed has been selected, the spindle is started and stopped by two buttons on the pendant. Spindle rotation may be reversed instantly at any time by throwing a toggle switch mounted on the head. The headstock offers a selection of twenty-eight spindle feeds by means of a newly designed planetary drive. It is driven through a hydraulically actuated clutch-and-brake mechanism with constant follow-up which automatically adjusts for wear.

Fast, firm clamping of the head, table, and saddle is assured by fully automatic hydraulic binders. These binders, which are an integral part of the gibs, are flexible sheet-metal bladders expanded by oil pressure. A hydraulically actuated draw-bar in the spindle is fitted with a milling machine taper and permits quick tool change without the necessity for drive keys or drifts. Control of spindle depth is provided by an optional Depth-Au-Trol unit that can be utilized with either manual or tape-programmed operation. A series of rotating discs permit twenty depths to be preset.

The Dynamill can be fitted with automatic tape control for the head and table. It has been designed to accommodate a modified General Electric Mark I system which includes a tape reader and a manual digital input system. The machine's clock type positioning dials give an accurate read-back of the functioning of the tape-control or the digital input system, thus making it possible to check program reliability.

One of the unsual features of the machine is the saddle ways and bedways. They are made of 0.040-inch thick, through-hardened, precision-ground steel strips with a 0.0015-inch thick hard chrome plate. Pairs of these inserts are locked securely in place by rolling in a dovetail-shaped copper-alloy binder. If it should become necessary to replace the ways, the strips can be quickly removed by pulling out binder.

Bullard has now perfected a variable-speed drive, Fig. 3, that is applicable to machine tools, rolling mills, and other heavy equipment. The first production model of this variable-speed drive is a 50-hp unit which is being applied to the new 46-inch Dynatrol vertical turret lathe. It has been designed to run at a constant input speed of 1800 rpm, delivering constant horsepower at any output speed from 112 to 1550 rpm (a ratio of 13 3/4 to 1) and constant torque from zero to 112 rpm. Table speed is infinitely adjustable throughout the entire range without steps or interruptions, and can be increased or decreased without stopping the table and under full load.

Speed variation is controlled by a single dial with pointer and accompanying calibrated rpm scale mounted on the pendant at the operator's position. It is only necessary for the operator to dial the desired table speed, which is then automatically provided through an integrated control device in the drive. A built-in safety device to prevent damage to both the variable-speed mechanism and other parts of the machine functions at a 25-per cent overload.

Circle 678 on Readers' Service Card

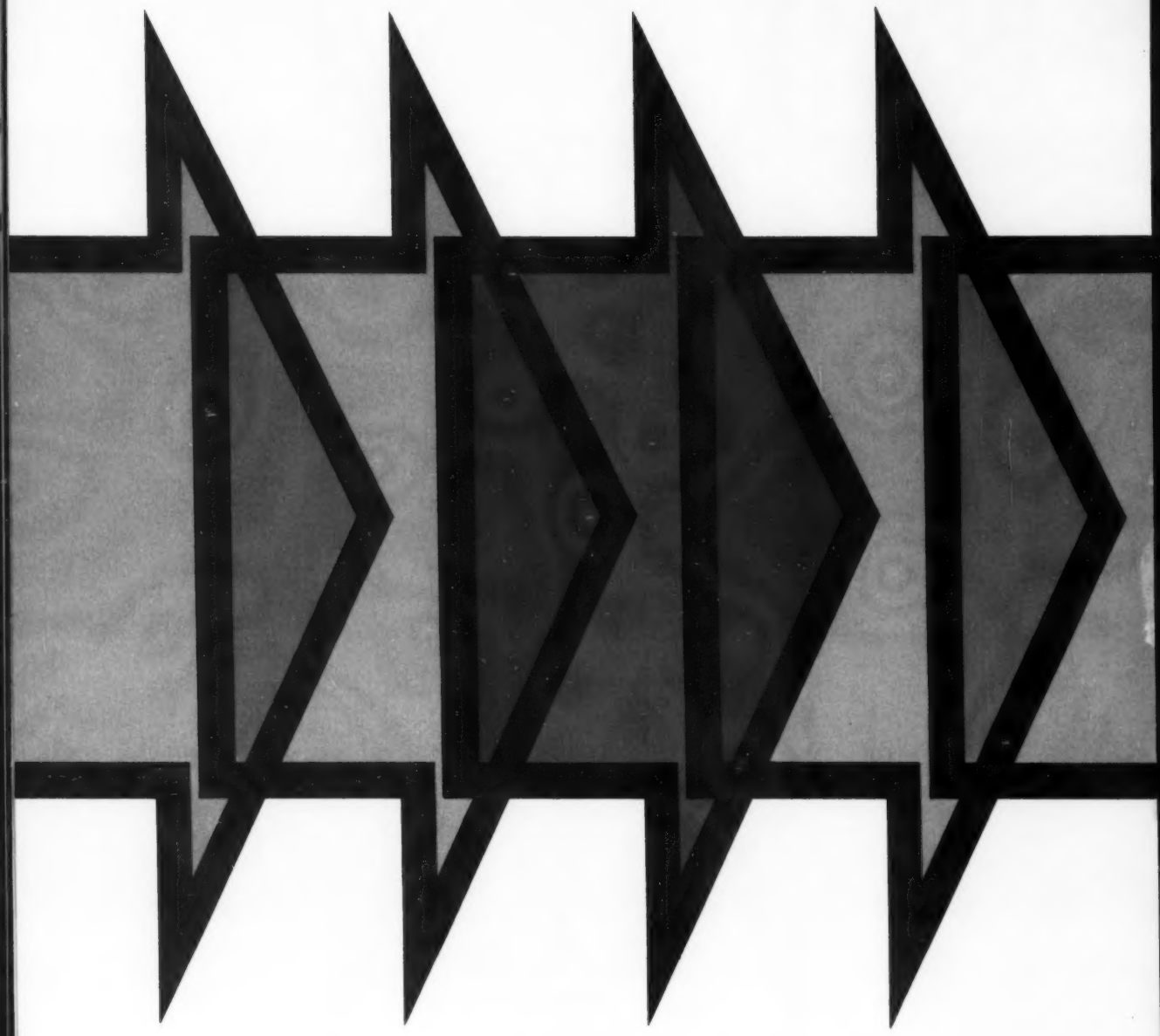
Airco Automatic Welding Wires

Air Reduction Sales Co., a division of Air Reduction Co., New York City, is now marketing welding wires especially developed for automatic welding by the submerged arc process. The composition of the wires is accurately controlled so that the fused metal of the resulting weld will have physical and chemical characteristics comparable to those of the parts welded.

Welding wires offered are low-carbon, general mild steel, high-tensile steel, highest-tensile steel, mild-steel killed, general high-tensile, and medium carbon steel. Wire are available in coils. Each coil is carefully thread-wound to facilitate unwinding, and a constant controlled tension is maintained during coiling to assure a coil that will support itself and keep its designed shape and dimensions.

Coils are available in weights of 25/30, 55/65, 75/100, and 120, or 180 pounds; or in fiberboard drums of 250, 500, or 750 pounds for uninterrupted production welding.

Circle 679 on Readers' Service Card



FROM GREAT LAKES STEEL

15 X-A-R 30
ABRASION RESISTANT STEELS

TWO NEW STEELS—HARDER FOR HARDER JOBS

X-A-R

ABRASION RESISTANT STEELS

HARD ENOUGH AND TOUGH ENOUGH TO LAST

Is abrasion your constant enemy? If your equipment meets materials as they're scooped, shoved, slid, pushed, dragged or dumped, does it face the recurring threat of downtime for repairs or replacement? To eliminate such maintenance headaches, Great Lakes Steel has developed two tougher, harder alloy steels—X-A-R 15 and X-A-R 30. They're supplied in hardnesses from 360 to 400 BHN (or, by agreement, in a range of hardness between 265 and 500 Brinell). And they're especially effective and economical in those critical bear-the-brunt areas of the equipment where wear is worst—liners, teeth, bars, blades and plates, for example. *Under conditions that commonly wear out equipment in a hurry, X-A-R abrasion-resistant steels outwear any other type of steel.*

Great Lakes Steel is a division o

WHERE MATERIALS COLLIDE WITH EQUIPMENT

Chemical composition alone is not the secret of low carbon X-A-R steels; their balanced combination of uniformity, high strength, hardness and toughness is the result of close control during heat-treating, quenching and tempering. This makes them more workable, too. Under normal welding and fabricating conditions use X-A-R 30. For *extremely* difficult problems, such as welding under cold conditions or extensive flame cutting, choose X-A-R 15.

X-A-R abrasion resistant steels are immediately available in ⅛" to 1" thicknesses, widths up to 72" and lengths up to 35'. For technical information and supply sources, see next page.

X-A-R

A PRODUCT OF

GREAT LAKES STEEL

Detroit 29, Michigan

NATIONAL STEEL CORPORATION

15 X-A-R 30

TECHNICAL INFORMATION

CHEMICAL COMPOSITION

X-A-R steels are furnished at two specified carbon ranges. These are 14 to 20 carbon for X-A-R 15 and 25 to 30 carbon for X-A-R 30. The balance of the typical composition is:

Manganese	.80%	Chromium	.65
Phosphorous	.020	Molybdenum	.20
Sulphur	.028	Zirconium	.06
Silicon	.60		

TYPICAL MECHANICAL PROPERTIES

	At Brinell Hardnesses of: 363	400
Tensile Strength, psi	180,000	200,000
Yield Strength, psi	165,000	180,000
% Elongation in 2"	17	16
% Reduction in Area*	56	55
Charpy V Impact at —75°F.	12 (Ft. Lbs.)	7

*Based on standard .505" specimen

ENGINEERING DATA

Resistance to Atmospheric Corrosion (Rural, Marine, and Industrial Environments)	3-5 times copper-bearing or carbon constructional steel
Compressive Yield Strength, psi	Approx. equal to Tensile Yield Strength
Ultimate Shearing Strength, psi	Approx. equal to Tensile Yield Strength
Modulus of Elasticity, psi	29/30,000,000
Endurance Limit (rotating beam)	60% of Tensile Strength
Coefficient of Expansion per °F.	70°F. to 200°F.—.0000062

FABRICATION

Cold Bend Test: Moderate bending can be performed within the usual range of hardnesses. For free bending, it is recommended that a mandrel be used not less than ten times the thickness of the metal through an angle of 90°.

Welding: Low hydrogen electrodes are recommended for welding X-A-R steels. The grade of electrode used is dependent on the strength requirement of the weldment.

Burning: X-A-R steels can be flame cut without pre-heating or stress relieving after cutting.

COMPLETE METALLURGICAL SERVICE

In addition to the information given in this folder, there is a great deal of detailed data available to steel users covering all characteristics of X-A-R steels. Furthermore, a thoroughly competent metallurgical service organization is available to work with you on any application problem you may have.

X-A-R STEELS ARE AVAILABLE AT THESE STEEL SERVICE CENTERS

BENEDICT-MILLER
Lyndhurst, New Jersey

JOSEPH DEMSEY COMPANY
Cleveland, Ohio

DUCOMMUN METALS & SUPPLY COMPANY
Los Angeles, California

INTERSTATE STEEL COMPANY
Evanston, Illinois

LOCKHART IRON & STEEL COMPANY
Pittsburgh, Pennsylvania

MARSH STEEL & ALUMINUM COMPANY
Kansas City, Missouri

O'NEAL STEEL, INCORPORATED
Birmingham, Alabama

SALT LAKE HARDWARE COMPANY
Salt Lake City, Utah

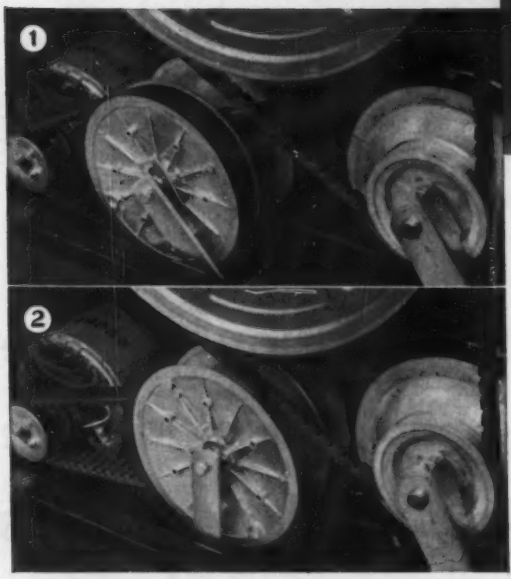
A. C. LESLIE & COMPANY, LIMITED
Montreal, Canada

15 X-A-R 30
ABRASION RESISTANT STEELS

IT'S LIGHTER THAN YOU THINK!

WITH HIGH STRENGTH THIN-WALL SECTIONS

WHEN DIE CAST WITH ZAMAK



A single zinc die casting—a conical disk 7½" in diameter—used in four different positions, makes up this speed changer mechanism for the General Electric Combination Washer-Dryer.

Cast with hub and radial reinforcing ribs and a projection-recess interlocking system (see view above, with one disk cut away to show cross section) two of these parts are pressed, back to back, on a bronze bearing to form a movable drive ratio adjustment. Two single pieces, locked on the ends of the tube, complete the dual-pulley assembly.

In position 1 (at left), the mechanism provides a regulated low speed for washing, rinsing and drying cycles. Moved upright, as in position 2, the drive is changed from an 8 to 1 ratio for centrifuging speeds during the water-extracting cycle.

Zinc die castings, because of their high strength in thin-wall sections, their dimensional accuracy, smooth surface and low cost, are the logical and obvious answer to the problem of producing these heavy-duty appliance parts.

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THE NEW JERSEY ZINC COMPANY

DEVELOPERS OF THE ONLY STANDARD ZINC DIE CASTING ALLOYS IN USE TODAY

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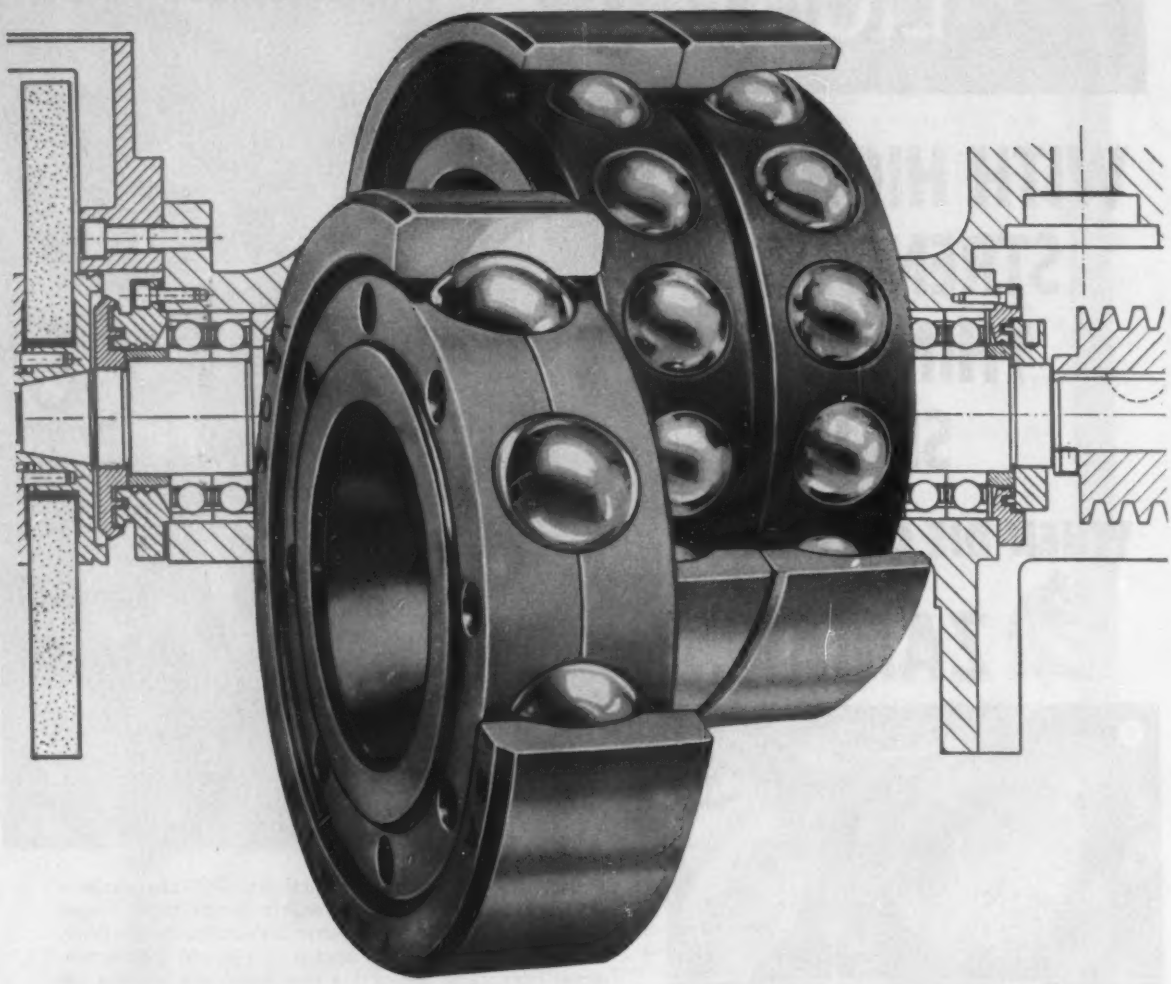

When you design for more precision... more speed... more output-per hour, design with FAFNIR Super-Precision Ball Bearings. Any type... for any purpose!

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Sept. 6-16, 1960
Navy Pier, Chicago

FAFNIR
BALL BEARINGS

NEW CATALOGUES

• Yours for the asking . . . use postcard inside back cover

Drills, Reamers, and End Mills

Chicago-Latrobe, Chicago, Ill. Catalogue 60 gives sizes and prices of company's carbon-steel, high-speed steel, and carbide twist drills, reamers, end mills, countersinks, counterbores, tool bits, screw extractors, lathe centers, arbors, etc.

Circle **Item 501** on Inquiry Card

Abrasive Cutting Wheels

Allison-Campbell Division, American Chain & Cable Co., Inc., Bridgeport, Conn. Brochure on principles of abrasive cutting, company's abrasive cutting wheels, and demonstration laboratory. Table gives wheel recommendations for wet and dry cutting.

Circle **Item 502** on Inquiry Card

Press Safety Controls

General Automation Corporation, Flushing, N. Y. Catalogue on the Trippit press safety controls which govern all press and brake operations from one compact unit. It explains how equipment will not operate if work is incorrectly nested or is wrong size.

Circle **Item 503** on Inquiry Card

Automatic Turret Lathe

Pratt & Whitney, Co., Inc. West Hartford, Conn. Bulletin 177 on Potter & Johnston 3E-15 automatic turret lathe gives details about a machine said to be brand new from the base up. Features include selector-switch cross-slide control and two coolant systems.

Circle **Item 504** on Inquiry Card

End-Finishing Machines

Pines Engineering Co., Inc., Aurora, Ill. Catalogue 401 on tube and rod end-finishing machines gives specifications on 2-, 3-, and 5-inch models for simultaneous deburring, chamfering, and facing; and for center drilling, reaming, forming, and pointing.

Circle **Item 505** on Inquiry Card

Tubing Selection Guide

Joseph T. Ryerson & Son, Inc., Chicago, Ill. Bulletin 12-10 on selecting steel tubing according to type, finish, analysis, formability, machinability, and weldability. It covers seamless and welded mechanical, hydraulic, and structural tubing.

Circle **Item 506** on Inquiry Card

"Sawology"

Nicholson File Co., Providence, R. I. "Sawology" handbook on variety and uses of saws, giving hints on blade care and tables on blade lengths, hook tooth and skip tooth selector, and raker and wavy set tooth selector. Questions and answers on saw practice.

Circle **Item 507** on Inquiry Card

Manual "Mig" Welding Equipment

Linde Company, division of Union Carbide Corporation, New York City. Bulletin 125-F3 covers continuous fusion and spot-welding machines and torches for Sigmatic—inert gas-shielded, consumable electrode, or "mig"—manual welding.

Circle **Item 508** on Inquiry Card

Nation's Largest Steel Plant

Bethlehem Steel Co., Bethlehem, Pa. Booklet describes company's Sparrows Point, Md., plant—largest steel plant in the nation—explaining operation of the various furnaces and mills. Flow chart traces the raw materials through the plant.

Circle **Item 509** on Inquiry Card

Rotary Benders

Wallace Supplies Mfg. Co., Chicago, Ill. Catalogue on complete line of rotary benders for the forming of tubes, pipes, bars, structural shapes, and channels from steel and nonferrous metals. Included are hand, semi-automatic, and fully automatic models.

Circle **Item 510** on Inquiry Card

Aluminum Buyers Guide

Joseph T. Ryerson & Son, Inc., Chicago, Ill. Bulletin 30-1 gives data on aluminum coil, sheet, plate, tubing, pipe, rod, and bar available from stock, with guide to selection. Included are specifications, analyses, properties, and corrosion resistance.

Circle **Item 511** on Inquiry Card

Inclinable Presses

E. W. Bliss Co., Canton, Ohio. Data sheet on open-back inclinable presses gives frame, bed, and slide specifications for the four sizes in the company's C series. Illustrated are two available clutches and an optional worm-gear inclining mechanism.

Circle **Item 512** on Inquiry Card

• Yours for the asking . . . use postcard inside back cover

Flexible Tubing Facts

Flexible Tubing Corporation, Guilford, Conn. "The Facts About Flexible Tubing" tells how nonmetallic tube and duct are changing the way of handling air, liquids, and light solids; gives forms, advantages, and suggested uses; describes six proprietary types.

Circle **Item 513** on Inquiry Card

Roller Thrust Bearings

Rollway Bearing Co., Inc., Syracuse, N. Y. Catalogue PT-659 on cylindrical roller precision thrust bearings explains various types; gives dynamic capacity and life nomogram, shaft and housing diameters, load ratings fitting practice, and applications.

Circle **Item 514** on Inquiry Card

Thread Guide

H. M. Harper Co., Morton Grove, Ill. Booklet, introduction to threads, gives various types and terminology. Charts detail measurements, characteristics, and capabilities of standard threads according to the Unified and American Thread Series.

Circle **Item 515** on Inquiry Card

Belt and Disc Sander

Walker-Turner Division, Rockwell Mfg. Co., Pittsburgh, Pa. Bulletin WT-79 on new belt- and disc-finishing machine. It shows a variety of sanding operations on metal and wood; how belt idler drum permits hollow grinding of cutting tools.

Circle **Item 516** on Inquiry Card

Multiple-Spindle Drill Heads

Thriftmaster Products Corporation, Lancaster, Pa. Catalogue 2 on multiple-spindle drill heads illustrates fixed-center, angular, rotating, and single- and double-eccentric adjustable types, as well as standard universal-joint adjustable types.

Circle **Item 517** on Inquiry Card

Metal Finishing

Lea Mfg. Co., Waterbury, Conn. Bulletin on company's plating and abrasive finishing products, methods, and services. It itemizes polishing compounds; adhesives and cements; wheel and belt lubricants; plating accessories. Lists plating processes available.

Circle **Item 518** on Inquiry Card

Presses and Press Brakes

Verson Allsteel Press Co., Chicago, Ill Catalogue 6-60 describes company's mechanical and hydraulic presses and press brakes, hydraulic shears, press and press-brake tooling, and special machinery. Included are specifications on presses and brakes.

Circle **Item 519** on Inquiry Card

Tracer-Controlled Milling Machine

Pratt & Whitney Co., Inc., West Hartford, Conn. Circular 642 gives details on the Keller BL-3622 Model C automatic tracer-controlled milling machine. Features include a new electronic control, mist lubrication of spindle, and three types of tracers.

Circle **Item 520** on Inquiry Card

Surface Grinder

Harig Mfg. Corporation, Chicago, Ill. Brochure on company's 612 precision surface grinder describes unique automatic forced-lubrication system, direct-drive spindle, and choice of right- or left-hand longitudinal feed—all available as standard equipment.

Circle **Item 521** on Inquiry Card

"Tailored Torque"

Warner Electric Brake & Clutch Co., Beloit, Wis. "Tailored Torque" brochure explains the Warner Electric operating principle, describes several clutch, brake, and clutch-brake applications; and gives torque ratings and dimensions for the complete line.

Circle **Item 522** on Inquiry Card

Portable Power Tools

Skil Corporation, Chicago, Ill. Folder illustrates, describes, and gives condensed specifications on company's lines of portable power drills, hammers, saws, routers, planes, sanders, shears, screw-drivers and nut-runners, grinders, polishers, and blowers.

Circle **Item 523** on Inquiry Card

Ultrasonic Flaw Detector

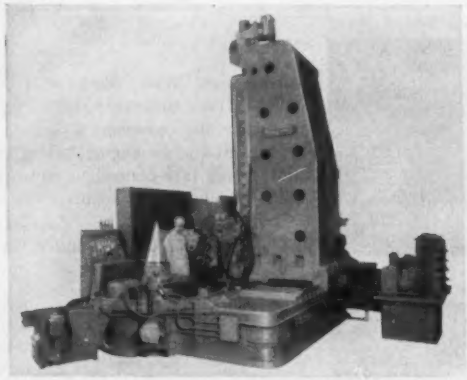
Branson Instruments, Inc., Stamford, Conn. Bulletin T200 on Sonoray Model 5 portable ultrasonic flaw detector covers operation, techniques, and specifications. It describes a new pulse-echo instrument; drawings show path of pulse through a test piece.

Circle **Item 524** on Inquiry Card

Numerical Control Solved These Tough Production Problems

Problem: *Drill and tap ojival, conical, and cylindrical sections for missile components.*

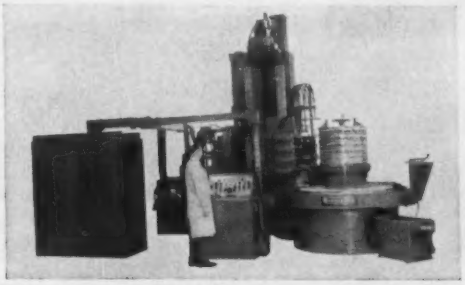
Solution: A BarnesdriL 2-spindle tape-controlled unit with four-motion-control, including a head that tilts to 15° plus or minus off horizontal center. Capable of handling parts to 36″ diameter and 72″ high, this unit gives ±.003″ positioning accuracy with repeatability to ±.0005″. Holes can be spaced



evenly or unevenly. Standard 8-channel tape also controls tool changes, coolant selection, rapid approach and return, sensing, etc. Rotary table indexes 360°.

Problem: *Reduce set-up and machining time on jet engine casings requiring 3 different hole sizes and up to 4 operations per hole.*

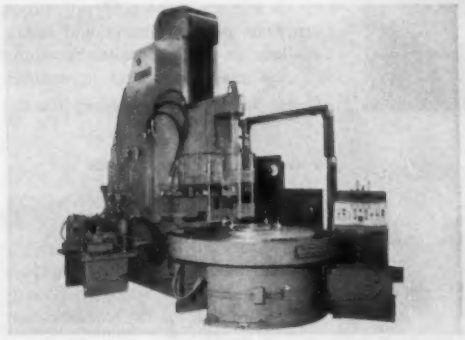
Solution: A 4-spindle, 2-motion BarnesdriL numerically controlled unit completes rough drilling, rough facing, finish boring, and generating front and back parallel faces on 248 holes in 4½ hours . . . a 74% savings



in set-up and machining time. Individual spindles are tape-controlled to operate from 3 different feed-out ratios, entirely eliminating tool changes. The machine has the ability to select exact position, hole size, and cutting depth quickly, and with extreme accuracy. Positioning is guaranteed to .003″, depth to .001″, and repeatability to .0002″, making it a highly flexible production machine for cylindrical parts up to 50″ in diameter and 40″ in height.

Problem: *Cut production costs on a variety of boiler plate and bolt circle work.*

Solution: A BarnesdriL numerical control unit cuts production time by 47%. This



is a single-spindle drilling machine with vertical spindle travel and a rotary indexing table with capacity to 50″ diameter and 42″ in height. Operations include combination drilling-countersinking, drilling-counterboring, straight drilling, reaming, counterboring, and countersinking.

Problem: *Informing every cost-conscious metalworking executive of other BarnesdriL advances and advantages in tape control machining.*

Solution: Write, wire, or call for complete information. We have detailed reports on the above machines.

BARNESDRIL PRODUCTION UNITS

BARNES DRILL CO.

820 Chestnut St., Rockford, Illinois

Detroit Office: 13121 Puritan Avenue

• Yours for the asking . . . use postcard inside back cover

"Rev-Lok"

Formsprag Co., Warren, Mich. Brochure on "Rev-Lok," a two-directional drive, positioning, over-running, backstopping device which eliminates all feedback torque from either direction. Operating principle, engineering data, and applications are given.

Circle **Item 525** on Inquiry Card

Chip-breaker

Kennametal, Inc., Latrobe, Pa. Supplement 10A on Dial-A-Breaker Kendex tool tells how a chip-breaker plate adjusted by a thumb dial is incorporated in a throw-away insert holder. Included are selection guide; data on negative- and positive-rake holders.

Circle **Item 526** on Inquiry Card

Mist Coolant Equipment

Bijur Lubricating Corporation, Rochelle Park, N. J. Bulletin on Spraymist coolant equipment shows applications to various machining operations; instructions on installation and operation, data on coolant units, Spraymist jets, dual assemblies, and accessories.

Circle **Item 527** on Inquiry Card

Bar and Chucking Automatic

Cleveland Automatic Machine Co., Cincinnati, Ohio. Bulletin 460 describes Model AB 3-inch, single-spindle Dialmatic machine. Features include a feed monitor, knob setting of turret tool feeds, and quick convertibility from bar to chucking automatic.

Circle **Item 528** on Inquiry Card

Current-Collector Bearing

Taylor-Winfield Corporation, Warren, Ohio. Bulletin 6-023 contains photographs and drawings of a current-collector type of seam-welder bearing; describes mounting of shaft spindle; shows cross section of single-pair current-collector shoes.

Circle **Item 529** on Inquiry Card

Flash-Butt Welders

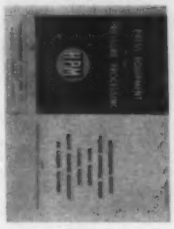
Taylor-Winfield Corporation, Warren, Ohio. Bulletin 7-213-A on Type B-5 flash-butt welders. Description covers welding capacities, electrical and mechanical specifications, controls, clamping fixtures, electrodes, backups, and upsetting mechanisms.

Circle **Item 530** on Inquiry Card

Stainless Steel Tubing

Summerill Tubing Co., division of Columbia Steel & Shafting Co., Pittsburgh, Pa. "A New Look Inside Stainless-Steel Tubing" shows company's processes from draw bench to bright-annealing furnace. Charts give sizes, analyses, and tolerances.

Circle **Item 531** on Inquiry Card



Press Equipment

Hydraulic Press Mfg. Co., Mount Gilead, Ohio. Bulletin 6000 describes HPM line of metalworking presses, metal-processing presses, dieing machines, C-frame presses, plastic-molding machines, die-casting machines, and hydraulic components.

Circle **Item 532** on Inquiry Card

"Toolease"

American Tool Works Co., Cincinnati, Ohio. Bulletin 801, "Toolease," describes the company's leasing arrangement for its engine lathes, radial drills, and tape-controlled positioning tables. It gives plan advantages in easy-to-understand language.

Circle **Item 533** on Inquiry Card

Magnetic Chucks

Taft-Peirce Mfg. Co., Woonsocket, R. I. Catalogue 414 on electromagnetic chucks, including rectangular, adjustable, and rotary models; permanent-magnet chucks, including rectangular and sine-bar models; wiring; accessories; special chucks.

Circle **Item 534** on Inquiry Card

Shaped Wire

Page Steel & Wire Division, American Chain & Cable Co., Inc., Monessen, Pa. Catalogue DH-1226-A on carbon- and alloy-steel wire in round, square, hexagon, and octagon shapes. It gives physical properties and methods of finding areas of common shapes.

Circle **Item 535** on Inquiry Card

Precision Tools

L. S. Starrett Co., Athol, Mass. Bulletin 143 describes line of new precision tools now available, including micrometer, vernier calipers and height gages, protractors, combination squares, trammels, dial indicators, rules, and dial-bore gages.

Circle **Item 536** on Inquiry Card

attention
tooling
engineers

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- SPLIT RING CHUCK enables internal centering and holding of large, thin wall tubing without distortion
- INCREASED CAPACITY CHUCK FOR AUTOMATICS featuring small diameter, large bore capacity and an unusually high lever ratio
- HIGH SPEED ROTATING AIR CYLINDERS
- POWER WRENCHES AND CHUCKS featuring controlled wrenching torque; eliminates laborious hand wrenching and operator fatigue
- CUSHMAN AIR and MANUALLY OPERATED CHUCKS —a world standard for precision, performance and longevity

ASK ABOUT THE NEW CUSHMAN SPECIAL CHUCK BOOK
Describing and illustrating special chucks engineered to meet specific workholding problems.

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Multipresses

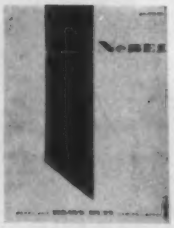
Denison Engineering Division, American Brake Shoe Co., Columbus, Ohio. Bulletin 120 describes applications to which Multipresses have been put. Included are cutaway view of design; engineering data on C-frame models from 1 to 75 tons capacity.

Circle **Item 537** on Inquiry Card

Environmental Chambers

Webber Mfg. Co., Inc., Indianapolis, Ind. Brochure 600 on environmental testing in controlled atmospheres. Color chart summarizes known data at altitudes from sea level to 2,000,000 feet. Other charts on atmosphere, temperature, and humidity are included.

Circle **Item 538** on Inquiry Card



Heavy-duty Lathe

Nebel Machine Tool Corporation, Cincinnati, Ohio. Bulletin 212 on the heavy-duty Model 2013 engine lathe explains and illustrates its geared headstock, quick-change gear-box, end gearing, carriage, apron, tailstock, bed, and other features.

Circle **Item 539** on Inquiry Card

Nickel-Chromium Alloy

Hoskins Mfg. Co., Detroit, Mich. Bulletin 110 on an 80-20 nickel-chromium resistance alloy for heating elements in controlled-atmosphere furnaces. Given are physical properties, life and temperature-resistance curves, and test data.

Circle **Item 540** on Inquiry Card

Automatic Drill Chuck

AMF Tool Division, American Machine & Foundry Co., Bloomfield, N. J. Folder describes Wahlstrom fully automatic chuck for all Moore jig bores. Sketches show how chuck can be opened and closed to change tools without stopping the spindle.

Circle **Item 541** on Inquiry Card

Production Lathe

Pratt & Whitney Co., Inc., West Hartford, Conn. Circular 641 introduces SIM T5 French-made 10-inch production lathe, for which the company is exclusive American distributor. Data are given on components, standard and special equipment.

Circle **Item 542** on Inquiry Card

Universal Grinding Fixture

Harig Mfg. Corporation, Chicago, Ill. Bulletin on Grind-All fixtures for grinding of perforating punches of different cross section. Views show indexing features, typical setups. Information on companion dresser arm and punch adapter is given.

Circle **Item 543** on Inquiry Card

Gaging and Control Equipment

Airborne Instruments Laboratory, division of Cutler-Hammer, Inc., Deer Park, N. Y. Handbook on Microtrol Type 160 gaging and automatic control equipment discusses electronic measuring units, comparator units, gage heads, etc.

Circle **Item 544** on Inquiry Card

Gage-Blocks

Van Keuren Co., Watertown, Mass. Catalogue 36B, Section B, describes and lists prices of rectangular gage-blocks and microgages individually and in sets. It gives sizes included in eighty-one and thirty-three block sets; states guarantee on tolerance.

Circle **Item 545** on Inquiry Card

Cam-Operated Machines

Earl A. Thompson Mfg. Co., Ferndale, Mich. Bulletin 22-A on Hydra-Cam machines gives advantages of cam design where multiple functions require power and control. It explains principle of oil column hydraulic linkages with rotary cam actuation.

Circle **Item 546** on Inquiry Card

Yoloy E. Steel

Youngstown Sheet & Tube Co., Youngstown, Ohio. Brochure explains features of Yoloy E, a low-alloy, high-tensile steel which combines corrosion resistance, high strength, and light weight with easy welding and fabricating. Chart on forming practice.

Circle **Item 547** on Inquiry Card

Metalworking Machines and Tools

W. A. Whitney Mfg. Co., Rockford, Ill. Hydraulic presses for punching, shearing, forming, notching, bending, squeezing, and riveting are described in Catalogue 60. Also included are portable and bench punch and presses, and a hand-operated shear.

Circle **Item 548** on Inquiry Card

Machine Tool Exposition
Sept. 6-16 Chicago

NIAGARA BOOTH 1330 MMT-PE

a whole press and shear show in itself!

Once again, Niagara has come through with the "newest of the new"! Never before have so many new developments in metal forming and shearing machines been planned into so large an exhibit area. All told, there'll be a "live" show of a dozen machines in operation . . . many engaged in actual production.

From aisle to aisle, here is an action-packed exhibit that will prove especially profitable to press, press brake, and shear users looking for new ways to boost production, improve work quality, and cut costs. Key men from Niagara (yes, top management, too) will be on hand to welcome you and answer questions-on-the-spot. Come. Visit Niagara. Allow plenty of time. See all there is to see.

NIAGARA

NOW TURN THE PAGE for a glimpse of what you'll see in Booth 1330

. . . AND they'll all be in action at the Machine Tool Exposition

Mech. Sleeve Clutch OBI Press with forming die and demonstration of Niagara Portable Tonmeter.

60-ton Inboard Drive Mech. Press Brake. Will perform several operations with multi-deck forming die.

100-ton Double Crank Straight Side Fully Automatic Press with progressive die. Will be shown in production along with Niagara's Load Monitor.

Underdrive Power Squaring Shear. 10 gage capacity. 96" cutting length.

Sliding Bolster Front-to-Back Crankshaft OBI Press. Will produce giant bottle openers with 2 quick change dies.

150-ton Double Crank Straight Side Press with 9-station transfer feed.

250-ton, 2 pt. suspension, Straight Side Eccentric Geared Press for automation line – Will produce parts with unique Adjustable Draw Die.

150-ton Mech. Press Brake with alternating 2-speed stroke control. Will form bends on long sheets.

45-ton Front-to-Back Crankshaft OBI Press with automatic roll feed, stock reel, & scrap cutter. Will stamp fuse tips at million/day rate.

Ultra High Speed Automatic OBI Press package with progressive dies. Will operate at variable speeds up to 1000 spm producing parts at rate of over million/day.

Overdrive Power Squaring Shear with 18" gap, ½" capacity, 144" cutting length.

400-ton Hydraulic Press Brake to be exhibited with variety of forming dies.

NIAGARA

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America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work

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Radius Miller

McKay Machine Co., Youngstown, Ohio. Bulletin on "Radii," a new machine which mills radii and other profiles on the ends of square, hexagon, flat, or round bars. Illustrations show simple procedure for positioning the stock in vise and feeding cutter.

Circle **Item 549** on Inquiry Card

Gear-Tooth Honing

National Broach & Machine Co., Detroit, Mich. Bulletin H60-6 concerns gear-tooth honing. Described are the honing principle and a new Red Wing Model GHD gear-honing machine. Features include four-way honing and crown honing.

Circle **Item 555** on Inquiry Card

Automatic Machinery

Precision Detroit Co., Detroit, Mich. Catalogue 60 lists the company's various automation components, Geneva motion index-tables, dial assembly presses, rivet spinners, assembly machines, tooling, and automatic feeds. Typical applications are included.

Circle **Item 550** on Inquiry Card

Drill Unit

Hartford Special Machinery Co., Hartford, Conn. Form GC-400 describes the all-new Model 17-400 air-hydraulic drill unit, using compressed air to stroke the spindle, and a pumpless hydraulic system to control the rates of rapid advance and feed.

Circle **Item 556** on Inquiry Card

Plastic Steel

Devcon Corporation, Danvers, Mass. Bulletin NI-103 describes "Plastic Steel," a compound containing 80 per cent steel for making jigs, molds, fixtures, and forming dies; and for rebuilding machinery and salvaging metal parts.

Circle **Item 551** on Inquiry Card

"Lusterized" Bars

Bliss & Laughlin, Harvey, Ill. Brochure describes exclusive luster finish now standard on all carbon and alloy cold-drawn steel bars produced by Bliss & Laughlin mills. The process removes contaminants and adds a rust-inhibiting layer.

Circle **Item 557** on Inquiry Card

Punches

Pivot Punch and Die Corporation, North Tonawanda, N. Y. Catalogue 700 describes precision shoulder punches, ball-seat punches, set-screw punches, pilot punches, pivot slug-ejector punches, die buttons, stripper bushings, and punch retainers.

Circle **Item 552** on Inquiry Card

Automated Set-Screw Driver

Standard Pressed Steel Co., Jenkintown, Pa. Bulletin 2302 on the Setomatic automated set-screw driver gives operating principle; compares its speed with other methods of set-screw assembly. Data is given on sizes that can be handled.

Circle **Item 558** on Inquiry Card

Adjustable Speed Drives

Cleveland Machine Controls, Inc., Cleveland, Ohio. Bulletins SL-351 and SL-352 describe nonelectronic adjustable speed drives of ⅓ hp maximum and ¾ hp maximum, respectively. Specifications and electrical information are given for each.

Circle **Item 553** on Inquiry Card

Die-Set Ball Bushings

Thomson Industries, Inc., Manhasset, N. Y. Bulletin 111 describes new ball bushings which are interchangeable with sleeve type bushings in existing dies, without modification of the punch-holder. Specifications on mountings and prices are given.

Circle **Item 559** on Inquiry Card

Chip and Scrap Handling

Gifford-Wood Co., Hudson, N. Y. Bulletin 900 on automatic chip- and scrap-handling systems. Tells of substantial advantages in four installations. Described are various components including "piano-hinge" and vibrating-trough conveyors.

Circle **Item 554** on Inquiry Card

Numerically Controlled Equipment

Pratt & Whitney Co., Inc., West Hartford, Conn. Circular 639 is a "show case" of point-to-point numerically controlled equipment: rotary tables and jig borers, with tape control of one, two, or three axes, and tape control of the spindle.

Circle **Item 560** on Inquiry Card

By E. S. Salichs

BETWEEN GRINDS

Fancy Fuels

An engine that runs on gasoline, diesel oil, kerosene, jet fuels, or even cleaning fluid was shown at the British Exhibition in New York City by an English manufacturer, Rootes Motors. The idea is to utilize the most economical kind of fuel available in any given area for vehicles, boats, farm machinery, and other industrial applications. But if you drive up to a filling station and the attendant asks, "What will it be today?," you really have a decision to make.

Swing and Sway but There to Stay

A quake-defying structure has been built in earthquake-prone Turkmenia. The structure, claimed to be indestructible, is a three-story building suspended on strings, like a pendulum, from the end of a rod, according to *Industrial Research Newsletter*. Nothing was said about the rod being attached to the earth; unless it is like a magician's rope, we assume, however, that it is.

Weep No More, Buy Instant at Store

Gentry, a division of Consolidated Foods Corporation, has been pioneering in the use of automation in the dehydration of onions. Read this poignant statement: "It was not until the dehydration of onions was accomplished in sufficient volume commercially that the age-old inconvenience (shedding tears, Ed.) and waste (peeling skins, Ed.) in preparation were overcome."

Guesses on Presses

How many Bliss inclinable presses were built from 1900 to 1959? This question, the subject of a nationwide contest sponsored by the E. W. Bliss Co., will be answered at the Machine Tool Exposition in Chicago, prizes being awarded to winners in three areas—the East, Midwest, and West. This being a guessing year, take a number now; we will tell you how close you came to the winners when we find out.

Expensive, Expansive Time

An atomic clock that cost $50,000 was recently installed in a Naval Observatory Time Service Station. At that price, we were glad to learn that it doesn't tell ordinary time, but will be used to help bring more accurate time to scientific projects throughout the world.

Did I Say That?

A voice typewriter has reportedly been developed by a research team at Kyoto University in Japan. The machine is said to transform speech into typewritten roman letters instantaneously, thanks to electronics. But what you say in Japanese comes out on the typewriter in Japanese. Now this is a smart typewriter, no doubt, but we'll bet that some day there will be a smarter one, transposing spoken Japanese into readable English, or vice versa.

Ex-Exhaust

A limestone mine, being used by the Government for the storage and rehabilitation of machine tools, was at the mercy of exhaust fumes as the tools were ferried into and around the cave by gasoline-engine industrial trucks. But the hazard was removed after the trucks were fitted with catalytic exhaust purifiers made by Oxy-Catalyst, Inc. The mine covers 65 acres; this calls for mass production of lamps, Alladin!

KEY TO CLARITY—The tiny synthetic ruby being examined by good-looking Shirley McDaniel generates almost no "noise" and will be installed in the "ruby maser" amplifier developed by the Hughes Aircraft Co. for the U. S. Army Signal Corps. This electronic ear can pick up signals from distant stars or space vehicles millions of miles away. The word *maser* stands for Microwave Amplification by Stimulated Emission of Radiation, and seems to us to be another good way of cutting down on static.

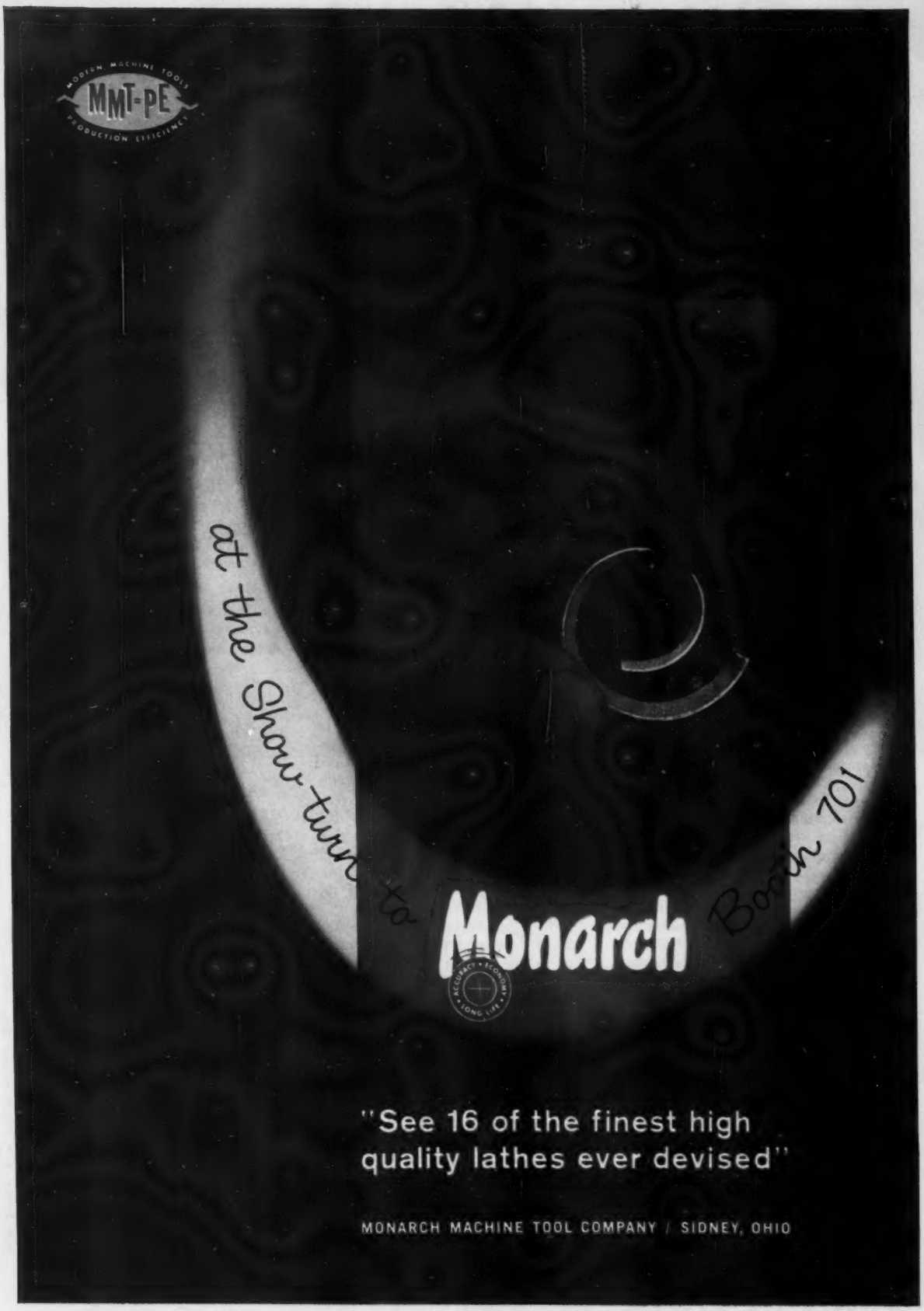

MMT-PE
MODERN MACHINE TOOLS
PRODUCTION EFFICIENCY
at the Show-turn to
Monarch
Booth 701
ACCURACY • ECONOMY • LONG LIFE
"See 16 of the finest high quality lathes ever devised"
MONARCH MACHINE TOOL COMPANY / SIDNEY, OHIO

Fig. 1. Coordinate-measuring microscope also measures a full 360-degree circle

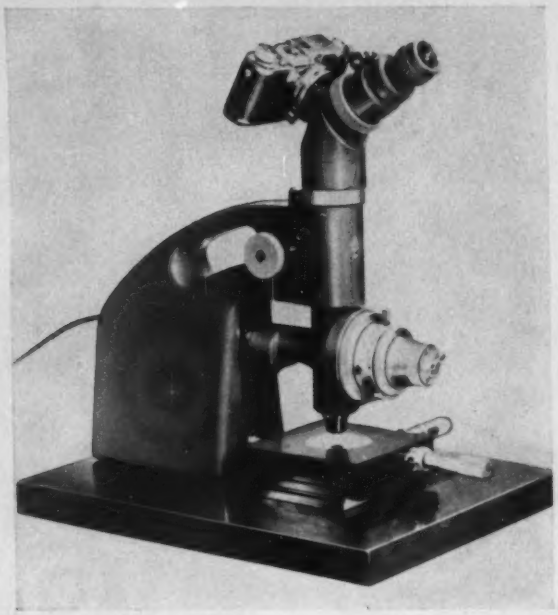


Fig. 2. Surface-finish measuring is done optically by portable interferometer

Toolroom and Inspection Instruments Featured in Opto-Metric Display

Booth 412

An extensive group of new optical inspection instruments and other quality control tools from West Germany will be demonstrated by Opto-Metric Tools, Inc., New York City. The Leitz 6- by 6-inch coordinate-measuring microscope, Fig. 1, fills a need which has existed for a means of accurately measuring large areas in both the linear and polar coordinates. This instrument has a direct measuring range of 6 by 6 inches in 0.00005-inch increments, and a full circle of 360 degrees in 10-second graduations.

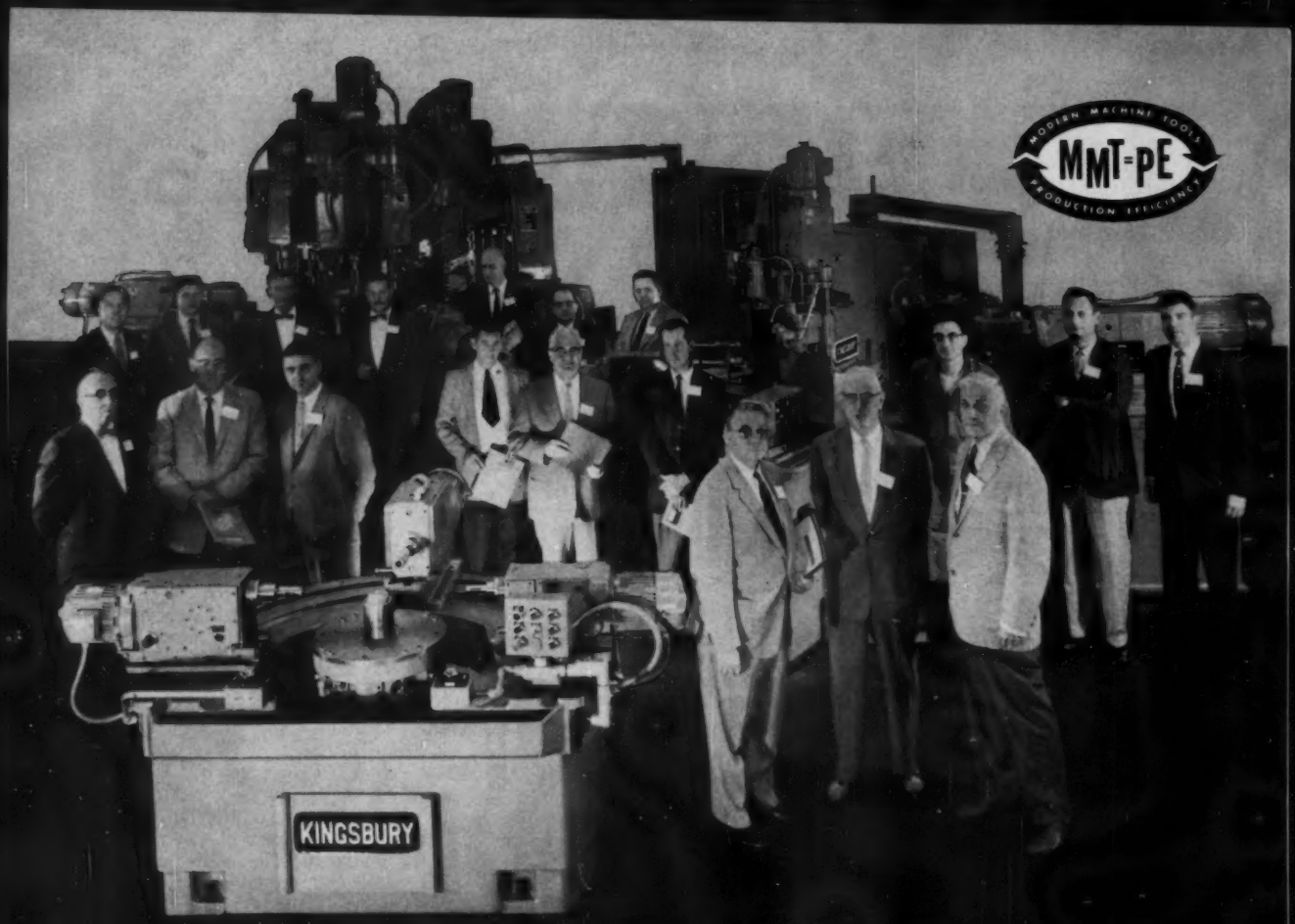
The microscope component of this machine has been borrowed from the Leitz optical jig borer of the same capacity, except that the motor drive and the spindle have been eliminated. They are replaced by a simpler upright and a microscope tube. Coordinate measurements are obtained for the full length of 6 inches from master glass scales whose intervals of 0.050 inch are read in 0.00005-inch graduations through a purely optical micrometer eye-piece.

Fig. 3. Auto-collimator's sixteen-minute measuring range increased to thirty minutes

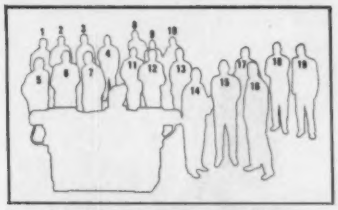
The light-wave surface tester, Fig. 2, is similar to an interference microscope, except that its construction follows the building-block principle to increase its adaptability to shop use. By omitting some of the components, it becomes portable for locating directly on large work such as textile calender rollers. The testing of the surface is done optically without contact by two-beam (Michelson) interferometry, either in white or monochromatic light. By this method surface irregularities between 1.5 and 80 microinches are measured. In addition, the pattern of the interference fringes gives a visual indication of the over-all condition of the surfaces.

To meet the requirements of the guided missile industry, the optical reading system of the Leitz thirty-minute auto-collimator (Fig. 3) was redesigned to provide an increased

Fig. 4. Duplex tester changes over from normal to any superficial Rockwell scale.



See You in Chicago!



1 C J Hanrahan, asst. supt.
2 D A Piper, product engineer
3 W Szacik, eng. supervisor
4 J N McHoul, sales engineer
5 E J Patria, superintendent
6 C R Adams, chief sales engineer
7 H J Gaseau, sales engineer
8 R D Swahnberg, sales engineer
9 J R Jarest, asst. chief eng.
10 H N Langley, applications eng.
11 R R Grover, development eng.
12 C B Clark, chief engineer
13 A F Anctil, eng. supervisor
14 R B Vaughan, sales manager
15 G Swahnberg, president
16 E J Kingsbury, chairman
17 E R Guilbeault, mach. operator
18 H M Frechette, v. p. & gen. mgr.
19 E J Kingsbury Jr, v. p. & treas.

not shown in photo
N J Stankiewicz, service mgr.
A H Knight, sales engineer
C E Loos, electrical engineer
C O Snow, asst. to the supt.

3 Automatic Indexing Machines Show How to Combine a Variety of Operations

Here in booth 731 of the Amphitheatre is equipment that is unexcelled for high production drilling and tapping work to close tolerances. Here too are attachments for performing a variety of operations in the same chucking of the work.

All of us plan to be here (but don't worry, not all at once). And we want to show you . . .

— 3 automatic indexing machines

— 8 different models of automatic drilling and tapping units

— 11 different head attachments for a variety of operations — boring, milling, recessing, oscillating, angular feed, speeder, planetary speed reducer, etc.

— other accessories — two-position hydraulic slide, coolant distributor, bushing carrier, etc.

Left — a fairly simple setup with 20-inch index table and three automatic drilling and tapping units.

Rear — a large setup with 63-inch index table and a center column that supports ten units. Seven units are mounted on wing bases. Suitable for many operations.

Right — a new basic machine with 40-inch index table and no center column. This new addition fits into our line between the other two types.

These machines have no special tooling, but we will be glad to talk to you about designing, building and tooling a machine all ready to produce for you.

See you in Chicago! Kingsbury Machine Tool Corp., Keene, N. H.

KINGSBURY

measuring range of thirty minutes, which is unusual in this type of instrument. It is essentially of the same design as the standard Leitz auto-collimator with sixteen-minute measuring range, and it also retains the 20-inch focal length by folded beam, 2 1/4-inch aperture, and purely optical reading in half-second intervals. The available accessories for the Leitz auto-collimator now include: two models of 90-degree reflectors; a deflecting mirror, penta prism, and alignment viewer; and five models of polygons.

Model 506 Frank duplex hardness tester, Fig. 4, combines the means for both normal and superficial Rockwell tests in one unit. Since there are six different tests possible altogether, the manual changing for these loads has been difficult and time-consuming up to now. In the Frank tester, the proper major load is selected conveniently and speedily by push-button control. In shifting from normal to superficial testing, a change in the minor load is also required. The conversion is equally convenient by simple switch.

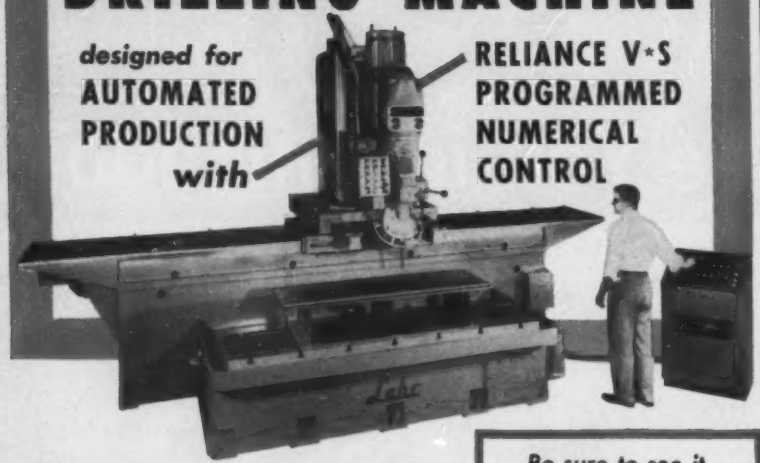
Circle 688 on Readers' Service Card

Lahr

heavy-duty

TURRET DRILLING MACHINE

designed for AUTOMATED PRODUCTION with RELIANCE V*S PROGRAMMED NUMERICAL CONTROL



The stationary work table permits loading of large pieces or parts, especially long and narrow work, and accurate drilling operations completed without a change in setup. Also, it is possible to position a number of small parts to run consecutively without change. The spindle covers the entire area of the work table.

The many features of design and operation will contribute greatly to increased productivity and better quality, as well as to reduced costs.

Lahr engineers are specialists in numerical control drilling machine designing and manufacturing.

Be sure to see it at the

PRODUCTION ENGINEERING SHOW

Chicago Navy Pier

RELIANCE ELECTRIC & ENGINEERING CO.

BOOTHS 411-417

September 6-16, 1960

or write for literature

Lahr MACHINE & TOOL CORP.

3400 MAPLEWOOD AVENUE • TOLEDO 10, OHIO

General Radio to Show Strobe Tachometer

Booth 630

Small and portable, Strobotac, Type 1531-A (illustration), features a fundamental speed (flashing-rate) range of 110 to 25,000 rpm and brilliant white flashes with extremely short duration (1 to 6 microseconds), so that fast action is stopped. The instrument will be demonstrated by General Radio Co., West Concord, Mass. The extremely short flashes are used to "freeze" high-speed motion of such rotating and reciprocating machine elements as cams, pulleys, governors, gears, fans, linkages, pawls, sprockets, and chains. No mechanical contact is required with the machine being measured. Therefore, the machine's operation is not affected and no power is absorbed.

A specially developed Strobotron lamp produces the high-intensity flashes, with peaks of 0.21, 1.2, and 4.2 million candlepower. Cycles up to 250,000 per minute can also be measured by using flashing rates that are submultiples of the speed to be measured. The entire assembly (packaged for versatility and convenience) is housed in a flip-tilt case that provides protection during transportation or storage, yet flips open quickly for use, resting on a table or bench held in the hand, or carried by a leather neck strap.

Circle 689 on Readers' Service Card

Portable strobe tachometer checks motion rates of rotating and reciprocating machine parts

Take the Gamble Out of Ring Inspection with Pipe Machinery Hilo Set Plugs

If you're relying on such questionable human yardsticks as "feel and shake" to determine whether or not your thread ring gages (solid or adjustable) are bell mouthed and out of limits, you're gambling recklessly with ring life—and possibly squandering it.

Pipe Machinery's new Hilo Plug provides a quick positive method for checking or setting thread ring gages... eliminates entirely any risk or uncertainty.

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Wickliffe, Ohio • Greater Cleveland

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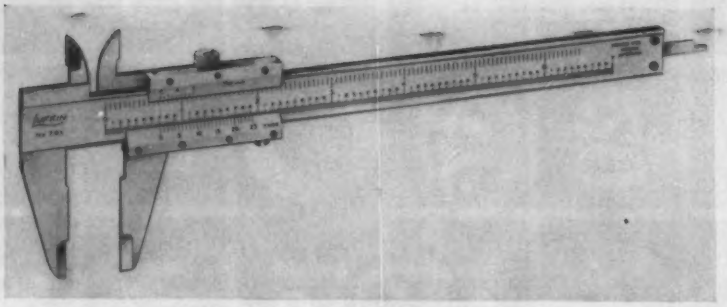


Fig. 1. Lufkin caliper has adjustable vernier plate

Lufkin Displays Measuring Tools Offering Space Age Accuracy

Booth 426

A variety of precision inspection and gaging tools adapted to electronic and guidance system hardware manufacturing will be displayed by the Lufkin Rule Co., Saginaw, Mich. An example is a new vernier caliper with adjustable vernier plate, Fig. 1, that can be reset to compensate for wear and resurfacing of its measuring faces. It is an extremely versatile tool because it makes inside, outside, and root measurements of gears and threads, and can be used as a depth gage. No. 701 vernier caliper is made entirely of stainless steel, and the extra long vernier has widely spaced, easy-to-read markings. The bottom scale has twenty-five divisions, reading by 0.001-inch increments. The top scale has eight divisions reading by 1/128-inch increments. Other features are the knurled pusher knob and the conveniently located thumb-screw lock. Measuring faces are ground and lapped for maximum accuracy.

Model 1011, large-diameter micrometer head, Fig. 2, is designed for applications requiring extra-fine adjustment on electronic equipment and missile hardware. It is also used

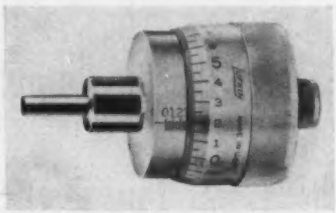
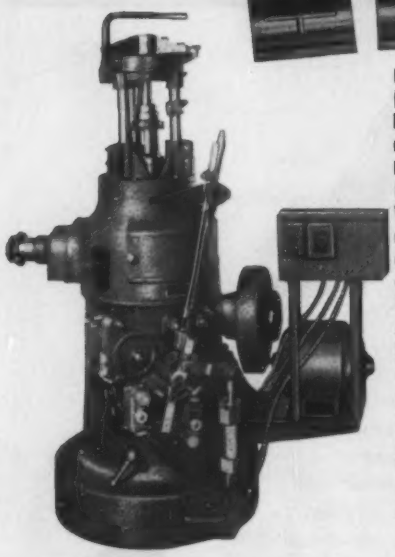


Fig. 2. Missile hardware accuracy is easily gaged by large-diameter, chromium-clad micrometer head

on special gages and tools, fixtures, and various machine tools. The 1-inch scale reads from left to right, with the spindle receding into the head as the reading increases. It is also available as Model 1011B with markings on the hub reading both ways.

Lufkin will also display a novel micrometer hole gage, Fig. 3, which provides a new and practical method for accurately measuring bore and hole sizes. It has specially designed contact points, permitting the taking of measurements at the bottoms of holes. The anvils of the gage are arranged for maximum accuracy. The smaller gage sizes have two opposing anvils, one fixed and the other movable. Gages in the range of 0.402 to 0.800 inch have three adjustable

Super High Speed
AUTOMATIC FEED
OIL GROOVING MACHINE
INCREASES PRODUCTION — CUTS COSTS



Now the High Production and Economical Operation of the WICACO CONTINUOUS OIL GROOVER can be doubled or tripled with the first and only Automatic Feed mechanism that permits the operator to run more than one machine, with every cut identical.

WICACO CONTINUOUS OIL GROOVER cuts grooves of every description, continuous or intermittent, and can be fitted with a pneumatic holding fixture synchronized with the Automatic Feed.

The operator loads and unloads the work without stopping the machine, a valuable time saver. Feed lever automatically returns to neutral position whn cutting tool reaches proper depth. The spindle, not the chuck, revolves, permitting fast and convenient grooving of a variety of larger and irregular work. The machine may be returned to manual operation very easily and quickly. Maximum depth of groove is 7/32", maximum width 3/8". Grooves may be cut in work from 1/4" I.D. to 4 1/2" O.D. Standard chuck holds work to 4 1/2" O.D. Stroke of spindle is 0" to 7". Floor space is 24" dia. and weight of machine is approximately 950 lbs.

The Automatic Feed mechanism can be supplied for attaching to older model Oil Groovers. Send us samples for grooving to specifications, time and cost estimate, without obligation. Ask for descriptive booklet.

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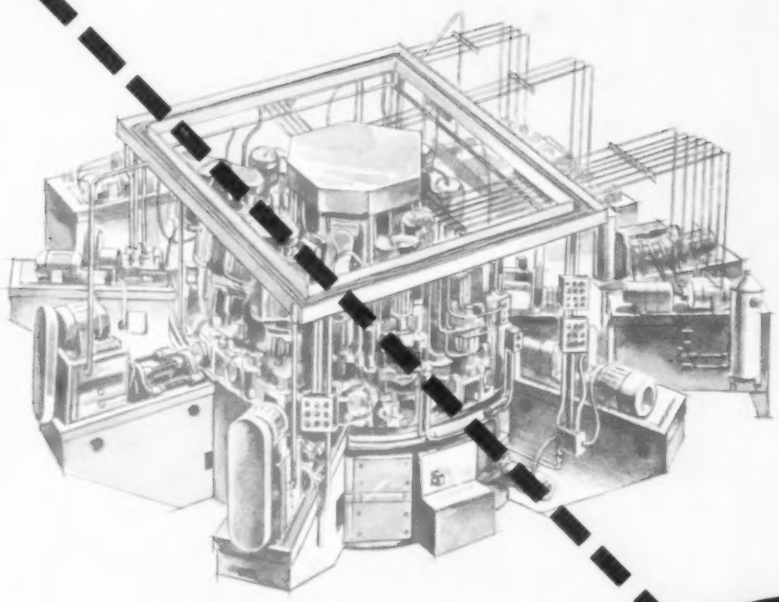
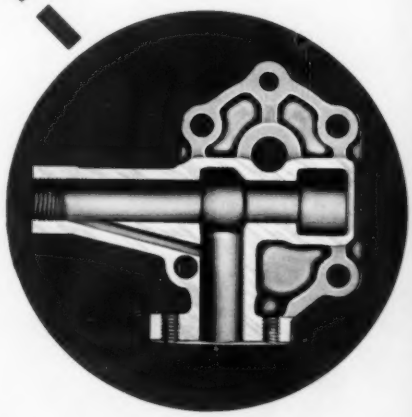


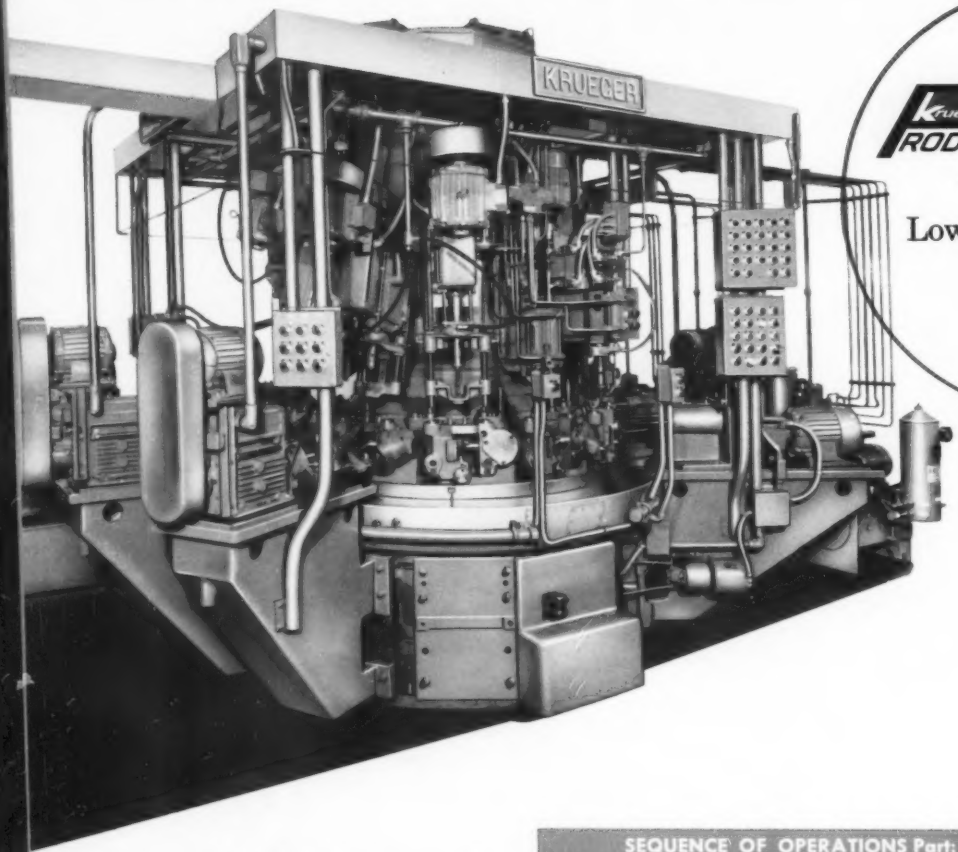


krueger

STANDARD CENTER COLUMN MACHINE

This standard Krueger Center Column Machine is set up to perform 19 precision operations on an automotive oil pump housing cover. Starting from a semi-finished casting, it delivers a finished cover every 18 seconds. The machine is of heavy cast iron construction and features a precision automatic Geneva motion type indexing table, 64″ diameter, requiring only 1.5 seconds to index. Krueger modular design permits easy adaptation of the machine to a wide variety of parts, simplifies periodic changeover problems, and reduces downtime during retooling periods. Detailed specifications and sequence of operations appear on reverse side.

Krueger Automatic Machine Tools



Krueger PRODUCTION CENTERS for Low-Cost, Precision Machining

Krueger Automatic Machine Tools are versatile, flexible "*Production Centers*" you can rely on to deliver major cost-savings year after year . . . job after job. The 12-station machine illustrated has been arranged to perform the operations listed on the right at a rate of 180 parts per hour gross. Compactly designed, it requires only 12′ x 15′ of floor space complete with horizontal wing units. This 12-station Center Column Machine is one of the many Krueger automatic machine tools at work today in widely diversified industries.

ADDITIONAL INFORMATION ON KRUEGER MACHINE TOOLS IS AVAILABLE ON REQUEST. WRITE TODAY.

SEQUENCE OF OPERATIONS Part: Oil Pump Cover

HORIZONTAL OPERATIONS	STATION	VERTICAL OPERATIONS
Load one part	1	
No operation	2	Spot-drill .40 dia
Drill (1) .560 dia. hole ½ depth	3	Drill (1) .186 dia. hole ½ depth
Chamfer (1) .560 dia. hole	4	Drill (1) .186 dia. hole to depth
No operation	5	Drill (1) .529 dia. hole ⅓ depth
No operation	6	Drill (1) .529 dia. hole ⅔ depth
Mill flange mounting face	7	Drill (1) .529 dia. hole to depth
Drill (1) .560 dia. hole to depth	8	Combination spot face and chamfer .529 dia. hole
Drill (2) .203 dia. holes	9	Rough ream .5615 dia. holes
Chamfer (2) .203 dia. holes	10	Finish ream .5615 dia. holes
Tap (2) holes for ¼-20 thread	11	Ream (1) .565 dia. hole
No operation	12	Tap (1) hole for ⅝-18 thread

SPECIFICATIONS

Integral Cast Iron Machine and Rotary Table Base • Cast Iron Center Column • Standard Krueger Hydraulically Actuated Units • Automatic Geneva Motion Type Indexing Table—64″ in Diameter • Standard Unit Mounting Wing Bases and Brackets Throughout • External Chip and Coolant System • Accessible Wiring and Hydraulic Lines • Automatic Lubrication Throughout • Hydraulically-Operated Fixtures.

hr Krueger & CO.

H. R. KRUEGER & CO. • 1469 E. GRAND BLVD. • DETROIT 11, MICHIGAN

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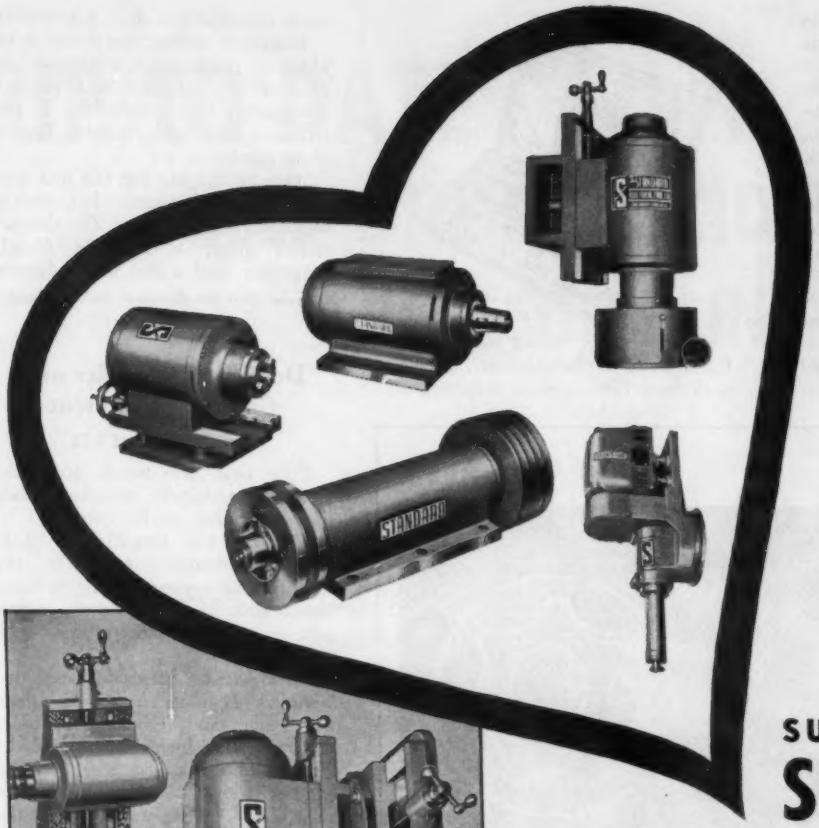
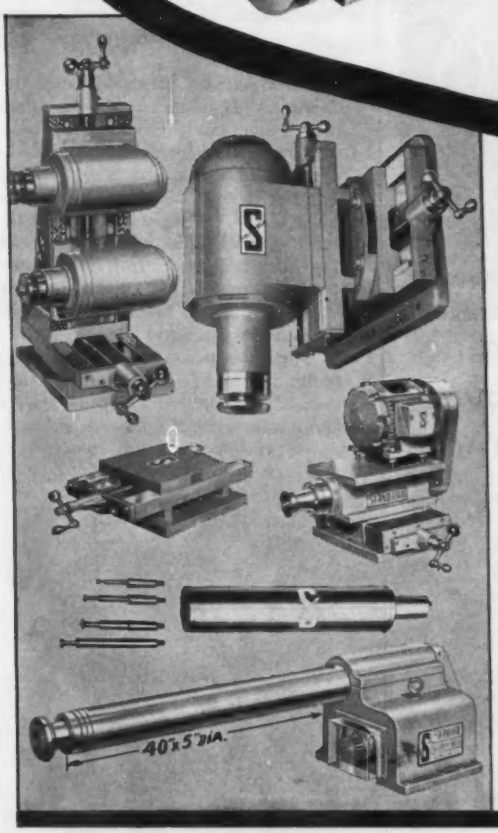


THE HEART OF THAT SPECIAL MACHINE

MACHINE TOOL OR CONVERSION



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Use the "building block" technique on that machine design problem. A Standard Super Precision Spindle **PLUS** the proper STANDARD slide, feed or swivel is truly "the heart" of the special machine that will do **your** special job. Standard Super Precision Spindles will mill, drill, bore or grind and Standard slides, feeds and swivels will take the spindle to the work, or vice versa, ACCURATELY **A THOUSAND TIMES A THOUSAND TIMES!**

Send for Standard's complete new Spindle Catalog TODAY . . . working drawings, specifications, complete technical data, on "building block" installations working all over America right now!

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SUPER PRECISION SPINDLES AND MACHINE TOOLS

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MMT PE

Booth 1450 MACHINE TOOL EXPOSITION CHICAGO Sept. 6-16

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anvils spaced equally, 120 degrees apart. Gages over 0.800-inch capacity have three anvils spaced at 135 degrees, 135 degrees, and 90 degrees around the head. This irregular arrangement assists in detecting the geometric error in out-of-round holes.

Other outstanding features are as follows: it measures directly by increments of 0.0001 inch; automatically aligns in the hole; measures most blind holes; has easy-to-read, large-diameter head; a satin chrome finish; and an easily adjusted friction stop. The hardened and normalized contact points are spaced for maximum accuracy and the hardened actuator rod does not revolve.

Fig. 3. Bores can be accurately gaged with these Lufkin's novel hole gages

Gages or setting rings are available to permit the setting to be checked periodically and reset if necessary. Two extensions, 4 and 6 inches long, are available for use in deeper holes.

Also on display for the first time will be a chromium-clad vernier height gage, Model 75 decima. radius gage, Model 124 Handi-Magnifier, and a dial test indicator.

Circle 690 on Readers' Service Card

DoALL Saw Blades and Gaging Equipment

Booths 116 and 118

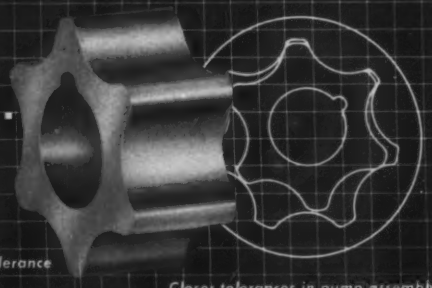
Four new saw bands and side-etched gage-blocks will be among the equipment to be exhibited by the DoALL Co., Des Plaines, Ill. In addition, demonstrations of the welding and reconditioning of band saws, and of dimensional control with new gaging instruments, will be performed.

The new saw bands to be shown include: a tungsten-carbide blade which will saw many difficult-to-cut materials; a 2-inch Imperial blade, having a high-speed steel cutting edge with teeth that are ground on all surfaces; a Super Demon blade, with specially hardened tooth tips for long life in cutting tough and abrasive materials; and a carbon-steel Dart blade made by a special process for extended life.

Demonstrations of measuring techniques will include the inspection of cutting tools with a stereo-zoom microscope, a Bausch & Lomb bench comparator, and bench cen-

Side-etched, stainless-steel gage-blocks made by DoALL Co.

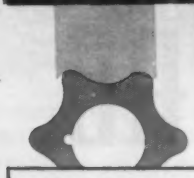
hoglund contour dressing...



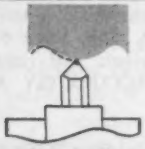
Six faces ground to .0002" tolerance and 9 microinch finish.

Closer tolerances in pump assembly increase rotor life and efficiency, improve slippage characteristics.

boosts impeller grinding rates—improves pump performance



13 stacked impellers are automatically indexed and the form ground in 6 separate positions.



After each impeller stack is ground, wheel is dressed at uniform peripheral speed with diamond normal to surface.

Hoglund Model 38A Dresser features computed master contour template, 10 to 1 inclined plane cam reduction, diamond cooling during dressing.

This impeller is typical of the countless form grinding applications where the accuracy initiated by Hoglund Contour Dressers enables both product and production improvement.

A Hoglund Model 38A Dresser, installed on a 12x40 surface grinder helped boost production 40%, improved tolerances, and lowered surface finish from 20 to 9 microinches. Combined high accuracy and high production are assured because: a) all Hoglund templates and ratio cams are individually computed to the job; b) only with the simplicity and ingenuity of inclined planes can you sustain accuracy and automaticity.

Over 120 different types of Hoglund Contour Wheel Dressers are now in service — enabling "tenth tolerance" contouring of intricate forms heretofore impossible to grind. They're adaptable to all types of grinders.

If you are grinding simple or intricate forms, you will want the whole Hoglund story in Hoglund's new technical brochure. Let Hoglund engineers recommend a suitable solution to your problem.

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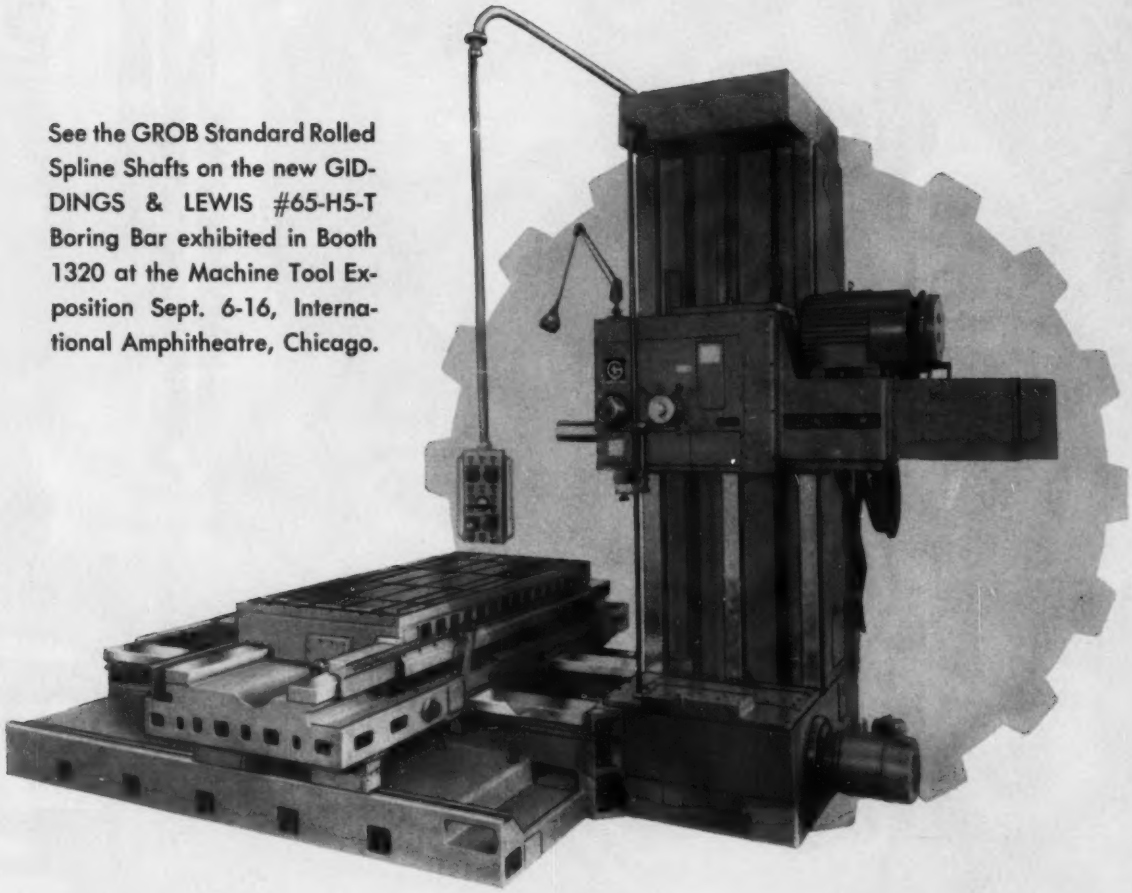
UP TO DATE MACHINE TOOL USES GROB STANDARD ROLLED SPLINE SHAFTS

See the GROB Standard Rolled Spline Shafts on the new GIDDINGS & LEWIS #65-H5-T Boring Bar exhibited in Booth 1320 at the Machine Tool Exposition Sept. 6-16, International Amphitheatre, Chicago.



GROB INC

GRAFTON, WIS.

Don't Fail to See 6-Pitch Gear Bars Being Rolled at the Coliseum Show Sept. 7-15, Booth 641.

For more data circle this page number on card at back of book

AN INSPECTOR CHECKS A "BOTTOMING" TAP for accuracy of the rake of the cutting face. Rex High Speed Steels help tapmakers produce the clean, accurate cutting edges so vitally needed in today's taps.

TODAY'S TRUE-RUNNING TAPS "TIGHTEN-UP" TOLERANCES

They produce more accurate threads—for closer fits

—because of continually-improved Rex® High Speed Steels

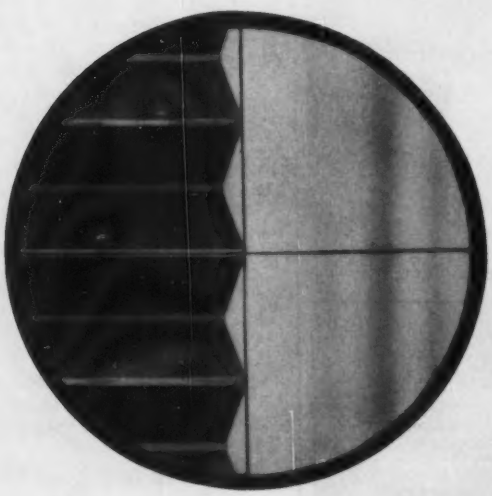
The ground-thread taps you now use produce more accurate threads—*and last longer*—even when tapping tough abrasive materials or today's high-strength alloys.

There's a story behind this development of more accurate and productive taps. It's the story of the tapmakers' continuing research and increasing skill—combined with Crucible progress in making better high speed steels.

To produce the fine steels needed for taps, Crucible tool steel specialists now use the most advanced electronic instrumentation available. For example: they can record the temperature of the molten metal in the melting furnace within 5 seconds. So, each heat is produced under identical temperature conditions.

Crucible specialists employ new techniques that also greatly improve deoxidation of the liquid steel. They use new ingot mold designs to minimize segregation. And they ultrasonically inspect every billet of Rex High Speed Steel before rolling or forging to ensure freedom from internal voids, flake, inclusions, etc.

For complete information on how Rex High Speed Steels can help make precision tools better, call or write Crucible branch office or service center near you.



THE RAKE ANGLE of a ¾-10 H5 "bottoming" tap looks like this — when viewed through the rake measuring instrument shown at left.

BETTER TOOLS, THROUGH BETTER STEELS. The constant improvement of Rex High Speed Steels ensures the increasingly better performance of hobs, broaches, twist drills, cutters and taps.

CRUCIBLE STEEL COMPANY OF AMERICA

Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Caldwell, New Jersey • Charlotte Chicago • Cincinnati • Cleveland • Columbus • Dallas • Dayton • Denver • Detroit • Erie, Pennsylvania • Grand Rapids • Houston • Indianapolis Los Angeles • Miami • Milwaukee • Minneapolis • New Haven • New York • Philadelphia • Pittsburgh • Portland, Oregon • Providence Rockford • Salt Lake City • San Francisco • Seattle • Springfield, Massachusetts • St. Louis • East Syracuse • Tampa • Toledo • Tulsa

For more data circle this page number on card at back of book

ters. They also will show how to inspect taps with a special tap checker.

Gaging products to be displayed are a reversible, double-faced black granite surface plate with two finished surfaces (described in April, 1960, MACHINERY, page 180); stainless-steel gage-blocks with always-visible side-etched sizes (described in March, 1960, MACHINERY, page 196); the electronic Trans-Chek which is portable and has variable heads; and black granite angle-plates with metal inserts that facilitate clamping and magnetic chucking. Other cutting tools, gaging equipment, and lubricants will be displayed behind one-way mirrors in shadow boxes; and a continuous movie on machine tools, cutting tools, and coolants will be shown.

A special Productivity Show, complementing the Navy Pier exhibit, will be presented by the company daily in its Hall of Progress at Des Plaines, Ill., a suburb of Chicago. Daily bus tours will be provided. An I/D Micro-Slicer for transistor production, the Electro band machine for sawing thin-foil honeycomb, and a band machine for contour sawing by remote control television will be demonstrated at the special show.

Circle 691 on Readers' Service Card

its specifications add up to high production capacity

Logan 14" Lathe

Logan No. 6565 14" Lathe

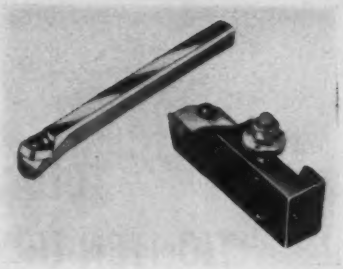
Logan designs greater reliability and accuracy, and longer life into its lathes by a generous combination of high-capacity features. For instance—

- An oversize spindle with 1⅝" bore turns on four super-precision ball bearings with built-in preload
- A variable-speed drive lets you change speed while work is turning—without shifting belts
- A warp-free lathe bed with high, strong walls braced by oversize ribs to withstand heaviest stresses; two V-ways and two flat ways are flame-hardened and precision-ground.

There are many more reasons why this and other Logan Lathes have a greater capacity. The complete specifications tell the story. Write for them.

- Spindle speeds to 2000 rpm
- 1½" Levermatic collet-chuck capacity
- 14⅝" swing over bed
- 9" swing over saddle cross slide
- 40" between centers

LOGAN ENGINEERING CO. Dept. K-960 4901 Lawrence Avenue, Chicago 30, Illinois



Boring-bar shank (at top) takes standard triangular carbide bits. At bottom is new profiling shank

Aloris Tool-Holders for Boring and Profiling

Booth 470

In a live display of machining production, Aloris Tool Co., Clifton, N. J., will demonstrate new quick-change toolposts and insert tool-holders at work. The booth will highlight the introduction of a line of six sizes of boring-bars (illustration, upper left) which accept standard triangular carbide inserts. The heat-treated tool-holder bars are alloy steel and range in shank size from 5/8 inch to 2 1/2 inches.

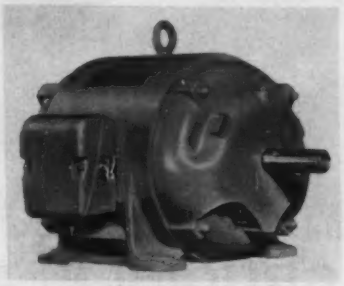
Sharing the spotlight in this booth will be a new profiling tool-holder for carbide inserts. This holder allows a 32-degree clearance for plunge cuts. The shank is provided with a fully adjustable carbide chip-breaker clamp and a protective carbide shim. It is obtainable for either right- or left-hand turning.

Circle 692 on Readers' Service Card

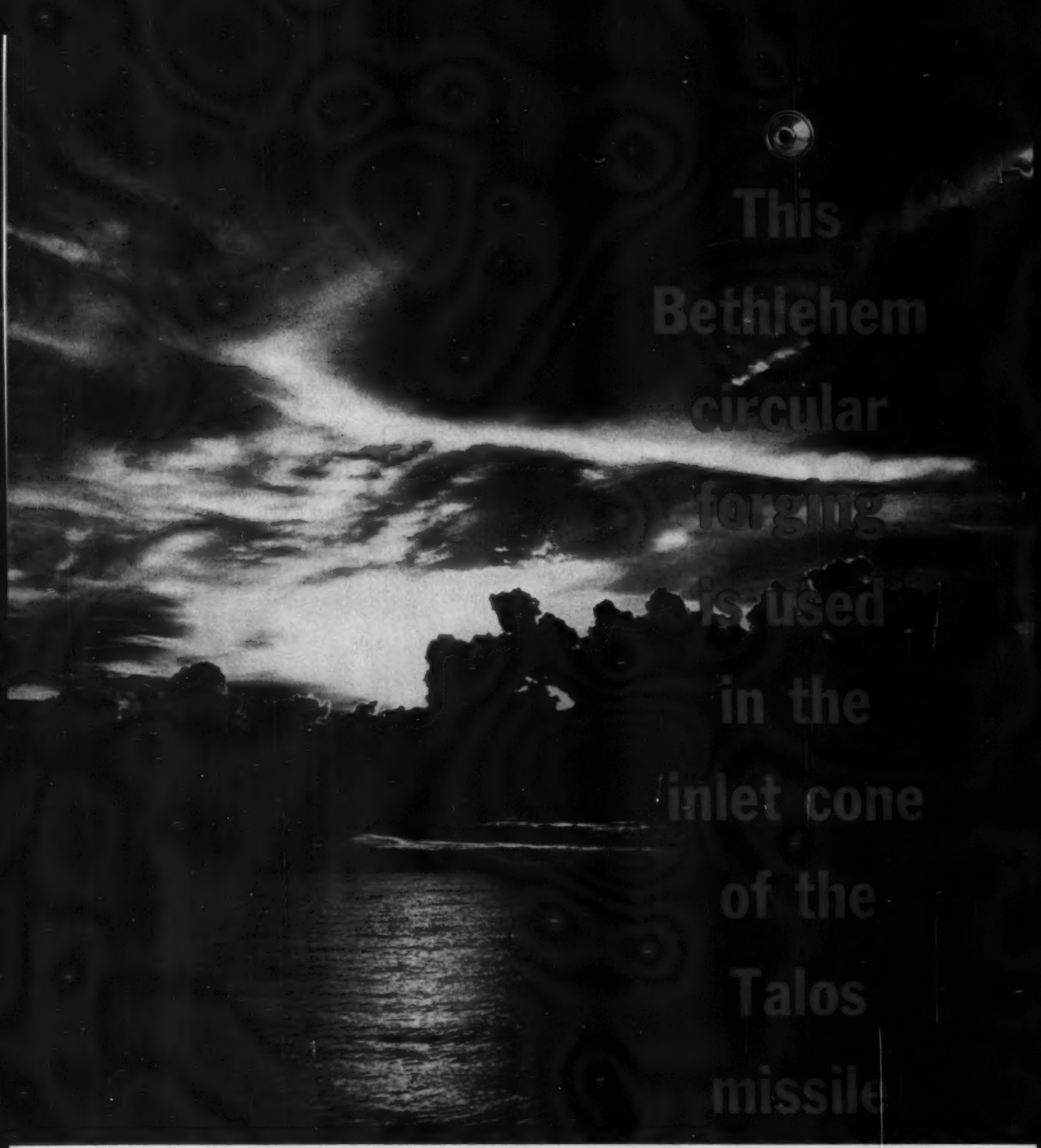
Brook Shows Compact Motors Designed for Cool Operation

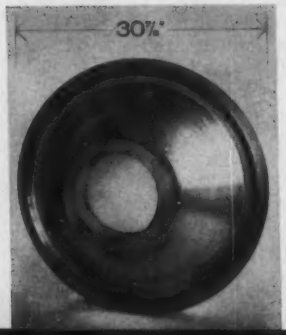
Booth 601

Why comfortably cool, alternating-current electric motors perform longer and more efficiently will be



Extra air intake vents in housing permit a more compact motor frame





Other than using magnaflux-quality steel, we make circular forgings for highly critical missiles exactly the way we make *every* Bethlehem circular forging. Same manufacturing processes. Same quality control. The success of Bethlehem circular forgings in missile inlet cones, forward heads, and adapters is just one proof of quality. If you'd like the whole story, get in touch with our nearest sales office. Or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

demonstrated in the exhibit of the Brook Motor Co., Chicago, Ill. The company will display a new line of open, drip-proof motors, from 1 to 600 hp, incorporating in their design an increased capacity for breathing.

Vents below the terminal box provide intake of cooling air in addition to the usual vents in the end-bells. Internal deflectors shield all vents against admission of rodents, large vermin, and debris. Despite the motors' smaller, compact frames, they operate as cool as motors in conventional bulky frames. Other desirable features include: preloaded ball bearings fitted at both ends to give quiet running; extra large lubricant reservoir in each bearing housing; a pure aluminum rotor firmly mounted on a high-tensile steel shaft and electronically balanced; a terminal box that can be readily rotated to four different positions; and clearly marked leads for easy wiring.

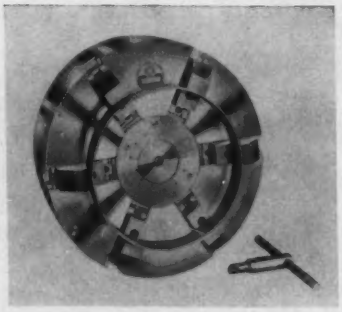
Circle 693 on Readers' Service Card

Skinner Chucks and Vises

Booths 212 and 214

The Skinner Chuck Co., New Britain, Conn., will display recently introduced work-holding devices and accessories. Featured will be a wedge screw chuck having a construction that utilizes a combination of a pinion, gear plate, screw, and wedge. This chuck, which was described in June, 1960, MACHINERY, page 284, combines features of hand and power chucks. It has an accuracy within 0.001-inch total indicator reading, repeatable within 0.0005-inch total indicator reading. A hand-indexing power chuck to be shown is designed for machining plumbing fixtures, valve bodies, universal joints, and similar items that require multiple-surface machining or grinding without releasing. This chuck was described in April, 1960, MACHINERY, page 174.

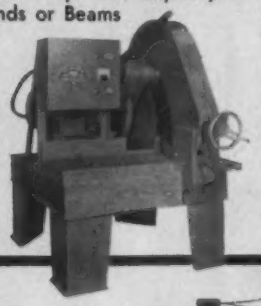
A twelve-jaw Horton pinch type chuck with controlled centering pressure for molding thin-walled sections, such as jet-engine and missile parts, will be a major item at the exhibit. It is made in sizes from 18 to 66 inches in diameter. An adjustable slip clutch with calibrated dial permits repeated chucking without distortion due to excessive centering pressure. Accuracy of centering is to within 0.001-inch total indicator reading. The standard design has twelve equally spaced floating independent pinch units and three equally spaced torque controlled centering jaws. Number and radial spacing of jaws can be varied to suit the application. Another device for holding thin-walled parts to be displayed is the Horton universal self-centering chuck with controlled gripping pressure. Adjustable from 0 to 150 pounds, it is available in diameters from 12 to 24 inches with three, four, or six jaws. Gripping pressure is controlled through a mechanical clutch which drives a scroll gear. The pressure range is indicated on a calibrated dial plate, permitting recording of the clutch setting for repeat setups.



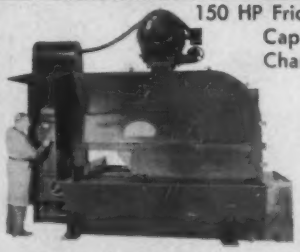
Twelve-jaw Horton pinch type chuck for thin-walled parts

Ty-Sa-Man America's Most Complete Line of Industrial Sawing Machinery

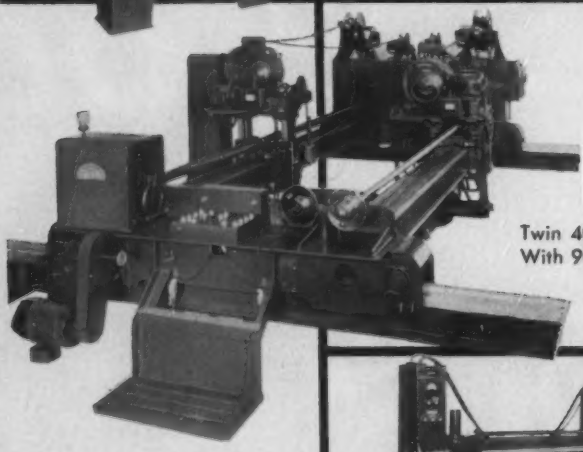
30 HP Chop Saw, Capacity 8" Rounds or Beams



150 HP Friction Saw Capacity 24" Channel

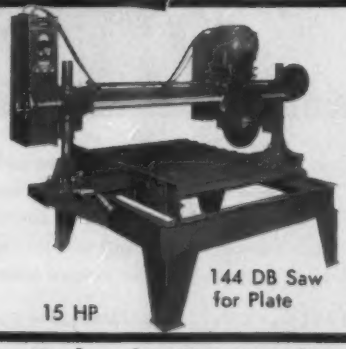


75 & 40 HP Model Available



Twin 40 HP Gantry With 90° Swivel Heads

If you can't cut it with a standard saw . . . call us! Ty-Sa-Man has built thousands of special and standard saws, one of which may solve your problem. If not, our engineering staff is at your disposal.



144 DB Saw for Plate

15 HP

TY-SA-MAN
MACHINE COMPANY, Inc.
1093 White Avenue
Knoxville 1, Tennessee

Write Today for Free Brochure

A brochure pictures and describes the functions of many metal saws. If you have a cutting problem, write or call today.

Two advanced -Verson- processes combined to provide more efficient production of machined parts.

In a perfect blending of two of metalworking's most efficient production processes, Verson has developed the Transmat-Impact Machining Press. It utilizes the Transmat principle of mechanical fingers to move the piece part from one station to the next. It also utilizes the cold extrusion principle of Impact Machining to form in two strokes of the press a part that previously had to be machined from a piece of solid bar stock by metal removal processes.

The part formed is the master cylinder for automotive brake systems. One Transmat-Impact Machining Press produces them at the rate of 30 per minute and replaces a bank of automatic screw machines. Material consumption is reduced by 47%. Impact Machining completely finishes the bore, ready for installation, and produces a significantly stronger part.

If you produce machined parts in quantity, you owe it to yourself to investigate Impact Machining and Transmat-Impact Machining. For full information and recommendations, send an outline of your requirements.

TRANSMAT PROCESS PLUS IMPACT MACHINING EQUALS LOWER COST.

The Impact Machining Press illustrated has a capacity of 300 tons. 30 parts per minute are produced. Area of slide and bolster is 36" x 54". The hopper feed is synchronized to supply slugs as needed.

-Verson-

See Metalworking's most advanced production processes in action at the Verson factory, September 6-16.

MORE!
Turn the pag
please . . .

AT -Verson- THE PROCESS IS MORE IMPORTANT THAN THE PRESS

TRANSMAT FORMING, originated and pioneered by Verson, utilizes synchronized mechanical fingers to move the piece-part from one station to the next fully automatically. Below is a close-up of the die space of the press shown on the reverse side of this page. Mechanical fingers pick up the slug and move it into position for the first operation. At the completion of that operation the fingers move it for the second operation and then to discharge. Transmat forming may be used for a wide variety of formed and drawn parts, as well as for Impact Machined parts. Production rates run as high as 2880 pieces per hour. Draws as deep as 10″ have been made by the Transmat process.

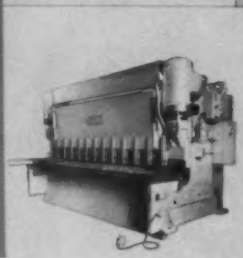
IMPACT MACHINING, a Verson development, is the cold working of steel and other metals by applying pressure with formed tools to create plastic flow. By producing in a press parts that would normally be made by forging or metal removal processes it is often possible to use lower cost materials . . . to reduce material consumption . . . to reduce machining requirements and to reduce materials handling costs.

Shown below are the various stages in the Impact Machining of the automotive master brake cylinder described on the reverse side of this page. The process starts with a coated slug; two press strokes form the part. A simple trimming operation completes it.

OTHER VERSON PRODUCTION PROCESSES ARE BUILT AROUND PRESSES LIKE THESE

Verson No. 10-F O.B.I. rated at 215 tons normal operating tonnage, 250 tons maximum operating tonnage; equipped with optional flanged slide.

Typical straight side hydraulic press. This model has a capacity of 800 tons.



Model HS-750-12 shear with a capacity of ¾″ x 12′.

Verson Press Brakes are made in a complete range of sizes and types for all requirements.

See Metalworking's most advanced production processes in action at the Verson factory, Sept. 6-16.

IMPACT MACHINING • MOVING BOLSTER PRESSES • DUAL SPEED PRESS BRAKES • COLD EXTRUSION • TRANSMAT FORMING • DOUBLE ACTION PRESSES

Verson

VERSON ALLSTEEL PRESS CO.

9300 S. Kenwood Avenue, Chicago 19, Illinois • 8300 S. Central Expressway, Dallas, Texas

Mrs. Florence Smith, operator of the Federal Products Corporation, achieves ultra-precise results with the No. 3 Moore Jig Grinder.

Woman operator at Federal Products maintains 50 millionths accuracy with No. 3 Moore Jig Grinder

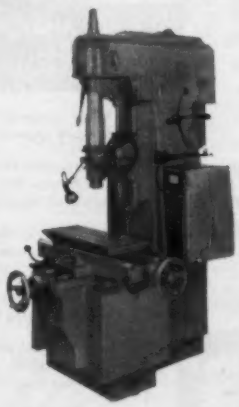
Moore Special Tool Company numbers among its long-time customers the Federal Products Corporation of Providence, Rhode Island—a leading manufacturer of dial indicating, air, electric or electronic gages—special equipment used for measuring, inspecting, sorting or automatic gaging.

The type of work produced by Federal Products calls for highly skilled personnel, not the least talented of which is a woman jig grinder operator, Mrs. Florence Smith.

Mrs. Smith has a *natural* mechanical ability. She is Federal-trained, starting in their plant during World War II. Most of her work is producing masters for precision gages with small holes and slots. Her work is extremely accurate—and she keeps complete records of work performance. She is able to maintain accuracy to within 50 millionths...using the No. 3 Moore Jig Grinder.

Moore machines have been dependable performers in Federal Products Corporation's precision grinding room for a number of years. The company also uses other Moore equipment, such as the Moore Precision Rotary Table and Moore accessories...all of which help Federal meet their customers strictest requirements.

Write today for literature describing all the advantages of the No. 3 Moore Jig Borers and Jig Grinders.



Partner in Precision: No. 3 Moore Jig Borer

This new Moore Jig Borer is unequalled for the speed and accuracy with which it bores, drills, reams and spots holes in dies, jigs and production parts. It breaks the "tenth barrier." It offers more precise positioning tolerances...improved drive ...wider speed range, 60 to 2250 RPM...larger table working surface, 11 x 24".

MOORE SPECIAL TOOL COMPANY, INC.
734 Union Avenue, Bridgeport 7, Conn.

HOLES, CONTOURS AND SURFACES. Tells how to produce tools and dies the modern way. 424 pages, 495 illustrations. $5 in U.S.A. $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

Packaged power chucking assemblies for screw machines, which are to be one of the feature items at the exhibit, were described in February, 1960, MACHINERY, page 196. A new series of ductile-iron trough vises feature a large trough for guiding the coolant and jaw openings equal to the full width of the jaws. Capacities are 4, 5, 6, 7, and 8 inches. A swivel base for setting the vise at any angle through 360 degrees is optional.

Other equipment to be shown are: soft blank top jaws designed for all chucks made to American Standards, available in a complete range of sizes in standard, extralong, extrahigh, and pointed shapes; and a new special-purpose chuck capable of holding work up to 40 inches in diameter on welding positioners.

Circle 694 on Readers' Service Card

New Limit Switch Actuator to be Shown by Denison

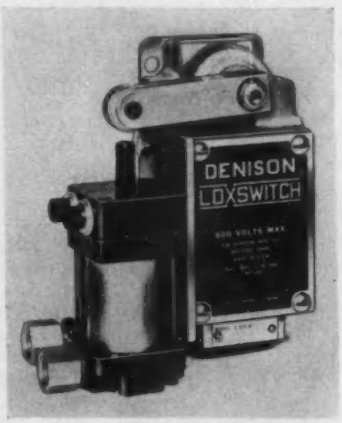
Booth 406

A handy air-actuated accessory, which permits the remote control operation of its Loxswitch Model L100W heavy-duty limit switches will be introduced by R. B. Denison Mfg. Co., Bedford, Ohio. This assembly, Part No. 2-1-1000, permits the mounting of a limit switch where maximum protection can be provided against moisture, dirt, vibration, and heat, as well as at locations which facilitate wiring and maintenance. The new device requires no air valve or air switch, and therefore permits actuation of limit switches in formerly inaccessible places. At the same time, it allows the use of a heavy-duty limit switch with its outstanding dependability and long life characteristics. Trip actuation is provided by an orifice 5/32 inch in diameter. Such holes are frequently found in equipment, in which case the switch uses no space whatever.

Suggested applications for the air-operated limit switch are: to provide a position indicator for a transfer bar or a fixture; to indicate the position of a guide bar or indexing shaft; to provide both a mechanical stop and an electrical interlock on an indexing table; to provide both mechanical stop and electrical stop for the lateral movement of a machine part; and to indicate the closing or opening of a press die or the location of a part within the tools.

In operation, the air-actuated unit, assembled to a Loxswitch Model L100 heavy-duty limit switch, is supplied air at 40 to 80 psi through an air inlet and inlet orifice. This air is allowed to escape through a bleeder line to a bleeder orifice. The closing of the bleeder orifice by any mechanical means allows the air to build up to line pressure in the air cylinder, which, in turn, operates the limit switch.

Circle 695 on Readers' Service Card



Heavy-duty limit switch operated by compressed air actuator

new
GREAVES
2-XH Milling Machines

more power at the cutter!

The completely new GREAVES No. 2-XH Milling Machine brings added versatility, increased operational ease, and more power where it's needed most . . . *at the cutter!*
It utilizes two motors, one for spindle drive; a separate motor for moving table, saddle and knee. Compare this and the other outstanding features of the new Greaves Mill. You'll see why Greaves is "The MOST Mill for the LEAST Money."

See them at Booth 1439, Donovan Hall, 1960 NMTBA Exposition

- Wide range of speed/feed combinations for any type material, any type job.
- Heavy, internally ribbed column casting and heavy duty rectangular overarm for maximum rigidity.
- Large, heavy-duty knee, saddle and table provide accuracy for all types of milling.
- New 7½ HP spindle drive motor, with separate motor for movable components, provides extra power for heavy milling.
- Easy-to-reach controls. Handwheels and vertical crank disengage automatically when not in use.
- New rapid traverse lever within operating control area.
- Separate drive motor for table, saddle and knee provides more smooth balanced power at the cutter.

GREAVES

J. A. FAY & EGAN COMPANY
2500 Eastern Avenue, Cincinnati 2, Ohio

here's the really new

Cleveland Worm and Gear

SPEED REDUCER

It was Designed to Provide: High Horsepower in a Smaller Unit • Centrifugally Cast Bronze Gears • Alloy Steel Worms Heat Treated By An Exclusive Process for Carrying Higher Loads • Fan Cooling for More Efficient Operation • Maximum Overhung Load-Carrying Capacity • Ribbed Housing for Maximum Strength and Heat Dissipation • Modern, Streamlined Design to Enhance Your Machine's Appearance.

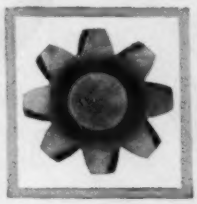
Cleveland's new speed reducer line meets AGMA Standard 440.03 — which permits higher horsepower and torque ratings — provides you speed reduction at savings of 50% or more on cost per horsepower. All this, with no deviation from Cleveland's standards of quality and dependability.

Remember, this strikingly new line of fan-cooled reducers — now available from one to forty horsepower — incorporates all the design knowledge gained by Cleveland's engineers over the past 47 years — plus all the advantages of modern metallurgical techniques and advanced manufacturing processes. Consult your Cleveland Representative for the complete story on this new speed reducer — or write us direct for Bulletin No. 405. It details input horsepower and output torque ratings, service factors, application and load classifications, as well as general over-all dimensions.

Cleveland Worm & Gear Division
Eaton Manufacturing Company
3276 East 80th Street • Cleveland 4, Ohio

CLEVELAND
Worm Gear
Speed Reducers

Check these new exclusive Cleveland features



Cleveland's Worm's, heat-treated by an exclusive process, possess a high degree of hardness throughout their entire thread thickness — and well below the worm's root diameter. This gives maximum thread strength and resistance to wear without losing the advantage of a tough core of medium hardness.

Centrifugal cast bronze rims have a greater density and a higher hardness, giving increased resistance to wear and fatigue pitting. They are centrifugally cast integral with cast iron centers on 6″ and smaller sizes. This permits strong mechanical keying of the two parts — without dependence on actual surface bond. Gear shaft extension diameters are especially large to permit greatly increased overhung load capacity.

Worm and gear shaft bearings are Timken taper roller type, providing adequate thrust and radial capacity. Worm bearings are mounted directly in the housing bore for greater rigidity.

For more data circle this page number on card at back of book

An Iguana will be recognized...
by a *HERPETOLOGIST*
(specialist in reptiles)

potential savings will be recognized... by a *LINCOLN* man

(specialist in arc welding)

ANY IDEA which can cut welding time from 90 to 45 minutes on missile beams for the Army is darned important! That's exactly what happened in a New Jersey plant.

A LINCOLN Field Engineer was walking through the plant with the Welding Foreman and Plant Manager. Naturally he was interested in watching the welding operation on missile beams. A thought crossed his mind. He asked if he could demonstrate LINCOLN Jetweld electrodes on the beams. He rolled up his sleeves; took some Jetweld from the trunk of his car, and cut the welding time from 90 to 45 minutes. The weldors on the job did the same.

That afternoon the Field Engineer finished his plant tour and spotted some applications for Fleetweld 37 electrodes for welding sheet metal on trailer bodies. Again welding time was cut almost in half, cleaning time reduced and overall costs slashed to the bone.

Quite a day's work for one Field Engineer . . . but putting PROFIT into welding operations is part of each LINCOLN man's job. You can count on him to show you . . . not tell you how to cut costs and make more money.

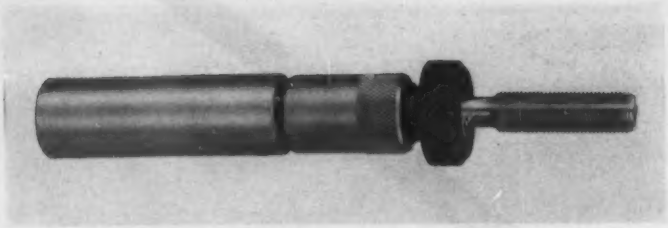
That's why we say it's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a "plus" at no charge.

Call your LINCOLN Field Engineer today.

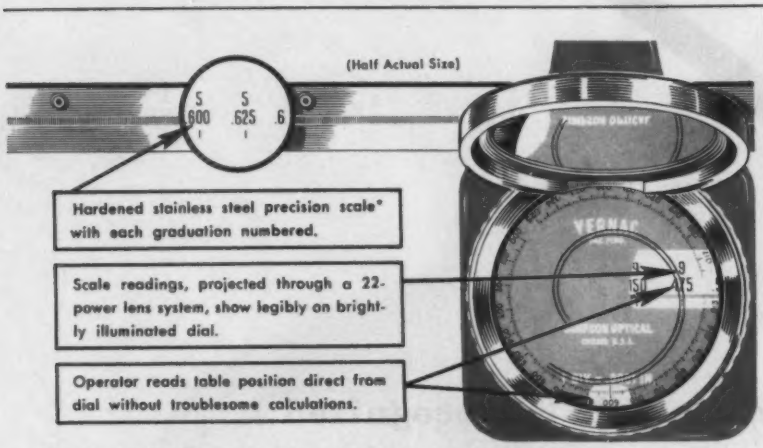
THE LINCOLN ELECTRIC COMPANY
Dept. 2230 • Cleveland 17, Ohio

LINCOLN WELDERS

For more data circle this page number on card at back of book



Tapping and threading tool with axial floating drive spindle


(Half Actual Size)
Hardened stainless steel precision scale* with each graduation numbered.
Scale readings, projected through a 22-power lens system, show legibly on brightly illuminated dial.
Operator reads table position direct from dial without troublesome calculations.

New optical measuring instrument assures . . .

high operating accuracy for new or used machine tools

The new VERNAC Direct Reading Optical Measuring Instrument eliminates the complexities of using end rods and gage blocks. Now, the longitudinal, lateral or vertical positioning of machine tool tables can be quickly and easily read direct to .0002". Accuracy is not affected by the wear or stretch of table movement screws. The instrument itself has no moving parts which can impair accuracy.

VERNAC instruments also up-grade machine tools to perform tasks beyond their original accuracy. For example, they can up-grade moderately priced milling machines to the accuracy of more expensive jig boring machines at a fraction of the latter's cost.

*The scale is a replica of a master certified by the U.S. National Bureau of Standards to .0001" maximum error over its entire length.

SEND FOR FREE BULLETIN. Explains how the VERNAC enables you to do more precise work on your present machine tools.

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Manufacturers and designers of precision optics for scientific equipment since 1926.

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Simpson Optical Manufacturing Company, 3204-06 Carroll Ave., Chicago 24

Send me free literature describing the VERNAC Optical Measuring Instrument.

Name

Company

Street Address City Zone State

Tapmatic Tapping and Threading Tools

Booth 157

Tapmatic Corporation, Costa Mesa, Calif., will feature a new line of compact tapping and threading tools incorporating axial floating drive spindles that allow them to determine their own lead. No machine or operator lead pressure is required. Another feature of these tools is a positive depth control. An adjustment of a knurled cap sets the desired length of stroke of the floating spindle. Re-engagement of the drive for retraction occurs when the machine spindle is reversed. These tools, which employ rubber-flex collets, have wide capacity ranges and relatively small diameters.

Circle 696 on Readers' Service Card

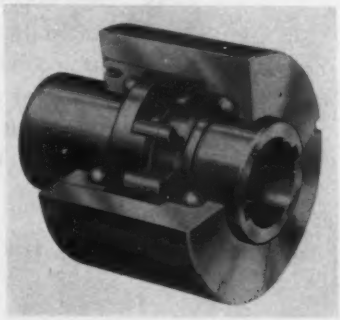
Formsprag Shows Torque-Transmitting Devices

Booths 323 and 325

Formsprag Co. of Warren, Mich., will display its entire line of basic clutches. Highlighting the exhibit will be its new Rev-Lok, a dual torque-locking and positioning device. It completely blocks the possibility of reverse torque feedback to the input shaft through the use of two opposing sets of full-complement sprags. This device operates both clockwise and counter-clockwise to drive, position, over-run, and backstop. Rev-Lok delivers maximum torque for size and weight, and is designed for high over-run speeds.

Other items to be shown will include high-performance over-running clutches (HPO), high-performance indexing clutches (HPI), hold-back clutches (HB), high-speed backstopping assembly complete with oil reservoir (HSB), general-purpose series (FS), and the Rawson line of all-metal centrifugal clutches.

Circle 697 on Readers' Service Card



Rev-Lok dual torque-locking and positioning device by Formsprag

LESS FRAME DEFLECTION CAN REPAY HALF THE COST OF YOUR O. B. I.

Is die life important on an O.B.I.? It certainly is! Die investment usually adds up to several times the cost of a press. Savings from just 15% or 20% improvement in die life is frequently enough to repay half your press cost.

This is why Danly O.B.I.s are built stronger, sturdier, to the industry's highest standards of rigidity. Danly O.B.I.s give you less frame deflection . . . more accurate die closure . . . longer die life . . . real savings in tooling costs! And other years-ahead design features, like Danly's exclusive low inertia air friction clutch, assure you of less downtime, lower maintenance costs, more dependable production.

Danly O.B.I. and gap frame presses have been setting remarkable performance records in the nation's largest press rooms for many years. Now this same Danly custom quality is available in a complete, standardized O.B.I. line, in capacities from 25 to 200 tons.

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DANLY MACHINE SPECIALTIES, INC., 2100 S. Laramie Ave., Chicago 50, Ill.

For more data circle this page number on card at back of book

Five New Items Round Out Skinner Valve Offerings

Booth 212-214

Completing the "L" series two-way valve line is a new valve with a 1-inch diameter orifice and 1-inch NPTF ports in normally open and normally closed construction (Fig. 1) to be shown by Skinner Electric Valve Division, Skinner Chuck Co., New Britain, Conn. Small and compact, it is designed to control such common media as air, oil, and water. Operating pressure differential is from 5 to 150 psi. Bodies are of forged naval brass, and internal parts are stainless steel and brass. A unique diaphragm made of laminates of nylon, coated with Buna-N-rubber, is fully supported in both on and off positions. Only a small portion of the diaphragm is exposed to pressure, assuring exceptionally long, trouble-free life. Explosion-proof versions for use in hazardous locations are approved for Class 1, Group D; and Class 2, Groups F and G.

The company has just added a two-way, high-pressure solenoid valve, Fig. 2, for direct-current operation to its "R" series line. This normally closed valve is offered for use on 6-, 12-, 24-, and 120-volt direct current with conduit or grommet housings. Orifice size is 1/4 inch in diameter, with 1/4-inch NPTF ports. Operating pressure differential is 5 to 1000 psi. The valve is designed for use with air, oil, water, and other common media. Internal parts are stainless steel, and bodies are forged naval brass. A spring-loaded plunger and spring-loaded piston assembly provide positive closing, permitting mounting in any orientation.

A new multiple-purpose three-way valve in the "A" series (not illustrated) has been designed for medium-sized cylinders. Available for both alternating- and direct-current operation, pressure differentials up to 250 psi are feasible. Pressure can be applied at any port. Body ports are 1/4 inch NPTF and sleeve

Fig. 1. Two-way "L" series is completed by 1-inch orifice valve

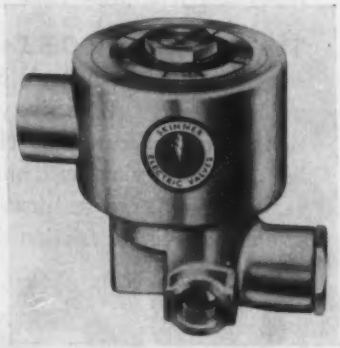
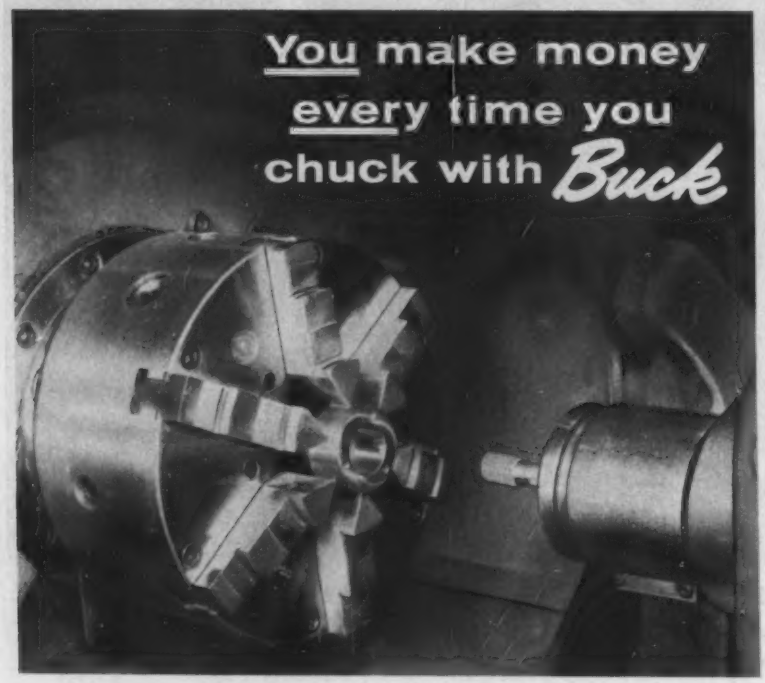
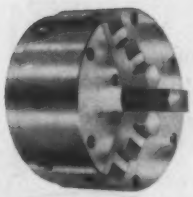


Fig. 2. "R" series of two-way, high-pressure solenoid valves is augmented by new 1/4-inch size

Only a rich man can afford old-style chucks!



Buck gives you this.....



Dead true precision... .0005" precision chucking duplicate parts... ends need for collets ... holds O.D. and I.D. true... takes up wear... compensates for spindle run-out...and there's NO PRICE PREMIUM!

If you haven't yet put Buck Ajust-Tru® chucks to work in your plant there are big and profitable performance surprises ahead. Send for complete information."It pays to chuck with Buck."

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NOW. . . *available from Bunting distributors all over America*

Bunting nylon puts at the disposal of engineer and manufacturer a tested material for bearings and parts that fully meets all requirements in which the unique qualities of nylon are desired. It is strong, tough, heat resistant, rigid but with high embeddability, and practically self-lubricating. There are many and various applications where Bunting nylon will improve performance.

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- Unusually wide range of sizes and shapes provides low cost fabrication and minimum of machining.
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Bunting nylon expands Bunting's comprehensive service—now supplying bearings, parts and bars made of cast bronze, sintered metals, aluminum and nylon. Available from stocks or made to blueprint for production and maintenance requirements.

EASY TO TRY IT

Small lots of special design Nylon bearings, or parts can be made immediately by fully equipped emergency machine shops in Bunting branches. The wide range of sizes and shapes of Bunting Stock Nylon makes the alteration of a stock item easy and economical. Your local Bunting Distributor can arrange for such work.

write for this Nylon Catalog and Listing No. 32

the BUNTING Brass and Bronze Co.
TOLEDO 1, OHIO

BEARINGS, BUSHINGS, BARS AND SPECIAL PARTS OF CAST BRONZE, SINTERED METALS AND ALUMINUM } *write for Catalog No. 58*

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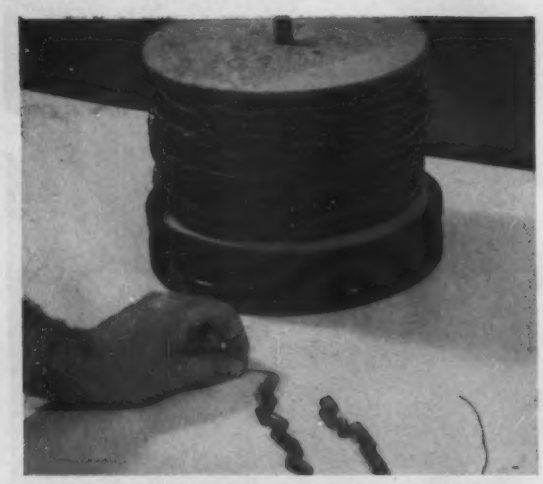
Reduce your assembled costs with new Spring-Flow® packaging



. . . more efficient handling, storing, sorting, orienting, feeding, placing of springs for installation

To production planners, Spring-Flow packaging opens up a world of possibilities for assembling A.S.C.-made springs, small stampings, and wire forms into your products easier and faster. It solves many problems caused by intricate shapes, tangling, loss by spoilage; maintains critical tolerances, uniform quality; simplifies inventory control and storage.

At the Production Engineering Show, Sept. 6-16, see this and other spring innovations at

BOOTH 204

To learn how Spring-Flow may solve your problem, contact the nearest A.S.C. Division, or write for Spring-Flow booklet giving additional information.

6004

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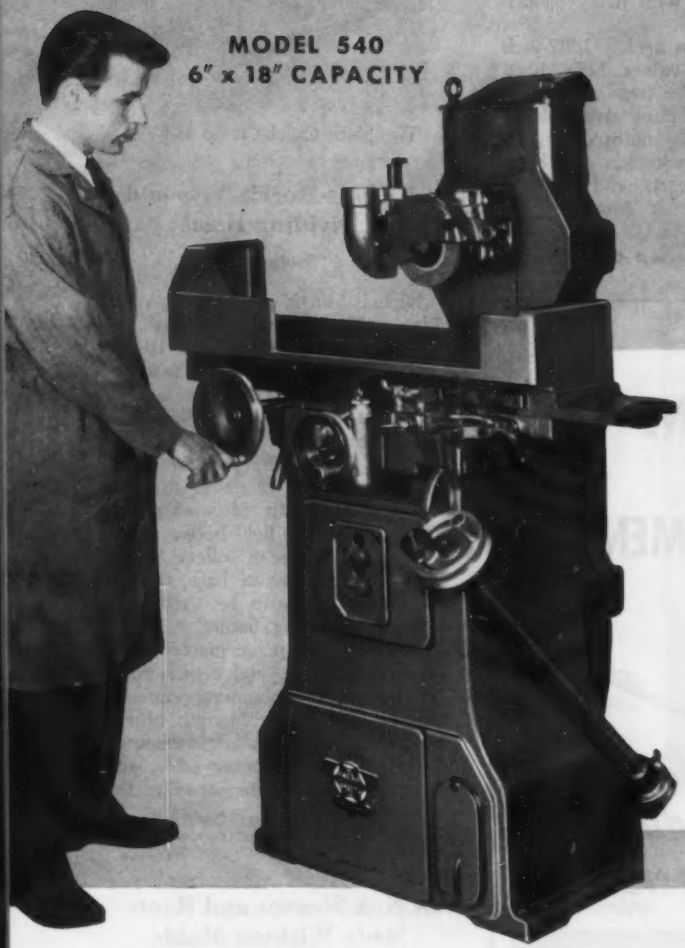

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DETROIT MICHIGAN
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ACCURACY... EFFICIENCY... EASE OF OPERATION

This machine has all the essential qualities required to provide high caliber surface grinding. Its simplicity of design provides ease of operation while inherent accuracy and efficiency assure excellent grinding performance. Thousands of these grinders have been purchased by discerning users in every part of the world.

FEATURES:

- Completely centralized controls within easy reach of operator.
- Patented low-pressure, long-life Hydraulic System operating from self-contained motor-driven pump unit.
- Table traverse rates variable from 5′ to 40′ per minute. Smooth and shockless reversing at maximum speeds.
- Cross-feed automatically variable from .01 in. to .07 in. per stroke.
- Hand controls provided for both traverse and cross-feed. Micrometer adjustment to cross-feed in .0001 in. divisions.
- Vertical adjustment of wheelhead controlled by conveniently placed handwheel having a micrometer knob adjustment in .0001 in. divisions.
- Wheelhead slide operates on ball bearing rollers running on precision ground bars providing absolute sensitivity of vertical feed.

Automatic vertical wheelhead feed and electric lift can be fitted to standard machine as an extra feature. Also, numerous other attachments including form tool grinding equipment are available to assure full versatility.

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PRECISION PRODUCTION THROUGH MICROHONING
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port, 1/8 inch NPT. Orifice sizes now available with these valves are 3/32, 1/8, and 5/32 inch.

A new 3/8-inch orifice, three-way, "L" series high-flow solenoid valve is designed for general industrial use. Used with such common media as air, water, vegetable and petroleum oils, inert gases, and kerosene and gasoline, this valve is light and compact, will mount in any position directly in the line, and operates on a pressure differential of 10 to 150 psi. The body is forged naval brass. Internal parts are stainless steel and brass. It is available normally open, normally closed, and for directional control, with both standard and explosion-proof construction. It is supplied in a wide range of voltages and frequencies with many electrical options.

New stainless-steel, 1/32-inch orifice solenoid valves have been added to both the two- and three-way V5 product lines. Available in both dual- and multiple-purpose types, these new valves have 1/8- or 1/4-inch NPT ports and have a maximum operating pressure differential of 400 psi.

Circle 698 on Readers' Service Card

King
MACHINE TOOL ATTACHMENTS
...Cut Production Costs!
King /AK
Model 400 BED TURRET for Engine Lathes
Converts to ram-type turret lathe production. Self-indexing six station head mounted on
King / AK
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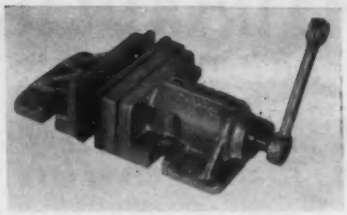
King MACHINE AND MANUFACTURING CO.
SINCE 1910



Two-piece Quick-Clamp Mil-Vise

Nichols-Morris Vise and Dividing Head

Booth 503

Nichols-Morris Corporation, White Plains, N. Y., will introduce two machine tool accessories, a 10-inch Model E universal dividing head and the Quick-Clamp Mil-Vise seen in the illustration. The dividing head is for heavy duty, and is equipped with a floating index-plate which provides a wide range of divisions to facilitate setup of work-pieces. The work can be held between centers, in chucks, or in collets. By use of an optional swivel base, the 10-inch head can also be used as a universal indexing fixture.

The new two-piece machine vise is available in 6- and 8-inch sizes, and provides a clamping capacity limited only by the length of the machine table. The work is clamped directly on the machine table, and the vise members are keyed to the table T-slots.

Circle 699 on Readers' Service Card

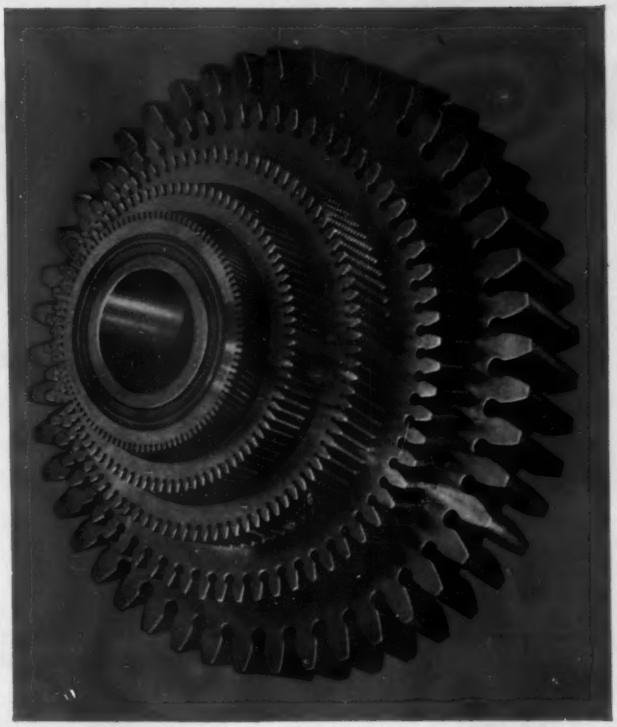
A & A Sleeves and Boots Made Without Molds

Booth 481

Bellows type protective covers made by an economical new method will be demonstrated at the Show by A & A Mfg. Co., Inc., Milwaukee, Wis. The Gortite-Sleeve protectors are airtight and oil-tight and can be made in any size or shape to cover piston-rods, spindles, vertical or horizontal lead-screws, and all shapes of machine tool ways and

Oil-tight way protector made by new Vulca-Seal method

WHY RED RING GEAR SHAVING CUTTERS DO SUCH AN EXCEPTIONAL JOB



- Here are some of the reasons for the accuracy, for the job performance and the long economical service life of Red Ring Shaving Cutters.
- These cutters are engineered and produced by skilled specialists who have, for the past 27 years, devoted full time to shaving cutters, exclusively. Never underestimate this vast fund of experience which is unmatched anywhere else in the field.
- All Red Ring cutter grinding and cutter inspections are carried on in temperature controlled departments, for maximum precision. Where else is this done?
- Every Red Ring Cutter is made from a controlled specification forging—proper grain flow and uniform distribution of carbides in the tooth zone.
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- Every new cutter design is given a thorough performance try out in the Red Ring Gear Laboratory before it is released.
- Red Ring cutter engineers and service specialists are always available for consultation and to help a cutter customer in an emergency.

When you buy cutters, take advantage of these extra benefits. There is no extra cost.

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ORIGINATORS OF ROTARY SHAVING,
GEAR HONING AND ELLIPTOID

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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

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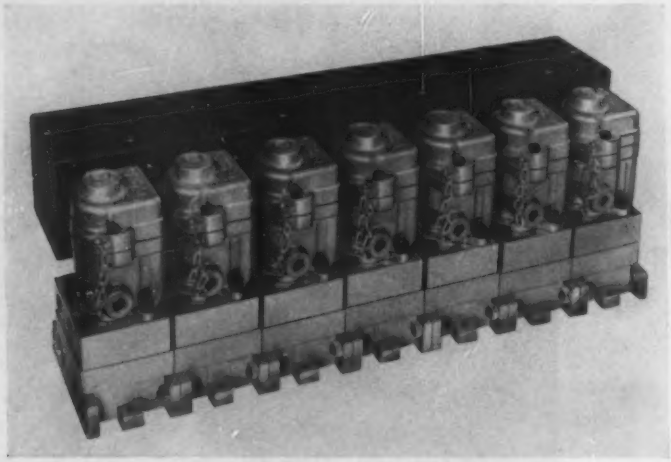
cross-rails. The gored, bellows type sleeves are formed by Vulca-Seal, a new method of vulcanizing the faying edges of neoprene-coated nylon fabric. No molds are required; consequently short runs of sleeves are produced at no greater unit cost than long runs.

Circle 700 on Readers' Service Card

Air-Power Control Progress to Be Dramatized by Ross

Booth 220

Outstanding contributions to the growth of compressed air power and control in industry over the past five years will be shown by Ross Operating Valve Co., Detroit, Mich.



Seven-station manifold mounting of Pacer solenoid air valves

One spectacular display will feature sixty units of the new Ross Pacer four-way solenoid valve, mounted in a long row on single-station manifolds after the manner illustrated. The circuit is designed to actuate the corresponding cylinders in a precision pattern. This setup dramatically demonstrates the new trend to manifolding a group of air valves at one station to simplify installation, operation, and maintenance. With this system only one air inlet supply, one electrical source, and one exhaust are required. The Pacer valve is compact, fast, economical, lightweight (with die-cast aluminum body), has high capacity, and is designed to JIC specifications. It will also be shown as a pilot on a four-way base mounted valve operating a double-acting cylinder.

Another eye-catching demonstration will be a 4- by 8-foot working scale model of a prototype small ware cleaning station in a modern foundry. Several small flat-top trucks move around the track system in a preselected, varied pattern. The operation is controlled by fourteen Ross Pacer three- and four-way valves actuating small cylinders. Colored lights behind JIC symbols on a glass panel trace the system in motion. Pneumatic control of conveyor operations is a relatively recent development.

The new Ross L-O-X valve actually locks out the air supply to all or part of a circuit during repair, maintenance, and shutdown periods. When the valve is closed, the air supply to the machine is shut off and air downstream is exhausted. The spool type valve can be padlocked in this position until maintenance or repairs are completed. This product will be set up in the display for do-it-yourself tryout.

A Ross development that will have its first public showing is a valve response timer. This equipment is direct-reading in milli-seconds. It measures the time interval between electrical circuit change and development of a preset pressure condition in a receiver connected to the solenoid valve under test. Measuring response time is an important factor in engineering of compressed air for machine controls.

Versatility permitting hundreds of variations characterizes the Ross Skyline series of air valves in the exhibit. Heads and bodies of all models are interchangeable, minimizing inventory requirements for spare parts. High-speed, long-life, small solenoids are additional advantages. Some of the numerous combining possibilities of these "building blocks" will be shown.

ALLEN
Heavy Duty
PUNCH PRESSES
Hundreds of Different Model Combinations 1 to 12 ton capacities
POWERFUL • DEPENDABLE
ECONOMICAL
FULLY GUARANTEED
MODERATE IN PRICE
See your Supply Dealer or write for Catalog giving complete information, specifications and prices on our line of Heavy Duty Punch Presses.
Thousands in Use the World Over
Model BT-12 12 Ton—$437.50 less motor—fob
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BULLARD DYNAMILL*

First fully Power-Controlled H.B.M.

The Dynamill* H.B.M. uses Bullard's new Dynamic Precision Control System to increase productivity of the machine and quality of the work.

Dynamill* now brings the work and tool together in the shortest possible time.

These features on the new Bullard Dynamill* H.B.M. provide optimum productivity:

- **Simple push button pendant control**
- **Easy-to-read clock type positioning dials**
- **Four traverse rates including creep**
- **Infinitely variable feed rates which can be changed while the tool is in the cut.**

Simple push button pendant controls and clock-type positioning dials accurately locate head, table, saddle, and spindle.

Available in 3, 4 and 5 inch spindle sizes, four standard head post heights, five table sizes and five bed lengths.

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For complete catalog.

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*TRADE MARK

HI-LITE FEATURES OF THE DYNAMILL* H.B.M.

POWER CONTROLLED Simple pendant controls start, stop and speed of spindle as well as all directional movements of head, table, saddle and spindle. Large, easy to read clock-type dials show exact position of work in relation to tool. Infinitely variable feed rates and four traverse speed rates. Power Draw Bar for fast and easy tool change. Fully automatic hydraulic binders for head, table and saddle.

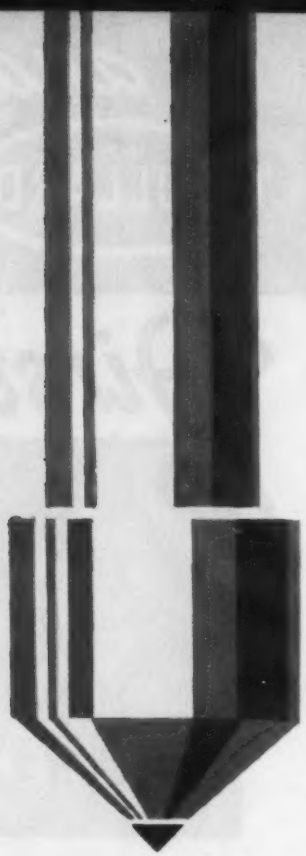
VERSATILE Saddle stops allow rapid traversing of saddle to pre-determined positions. Depth-Au-Trol* provides accurate spindle depth Control. Modified Mark 1 Tape Control for head and table positioning. Continuous feed facing attachments with infinitely variable feeds. Right-angle milling, thread cutting and contouring attachments. Built-in or auxiliary tables.

COMPACT AND RUGGED The new Bullard Dynamill* H.B.M. is compact in design — lower in overall height — requiring less floor space, yet has more built-in rigidity and durability.

EASY MAINTENANCE Automatic lubrication throughout — fewer parts — fewer adjustments — easily accessible.

"YOU CAN'T BEAT A BULLARD"

Diamond-impregnated tool



Truing tool

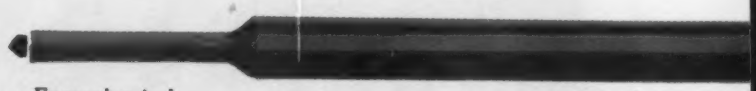
When you consider the job they do,

DIAMONDS CAN BE YOUR CHEAPEST CUTTING TOOLS

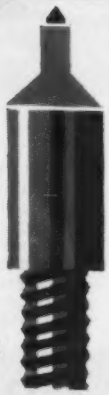
It's true that diamond tools may *seem* costly. But the real cost of any tool is the first cost divided by the work it does.

And diamonds usually work at higher speeds, do the job more quickly. Diamonds last longer, so tools don't have to be changed as often. Setups are reduced. Your people spend less of their time changing tools, more of their time operating machines.

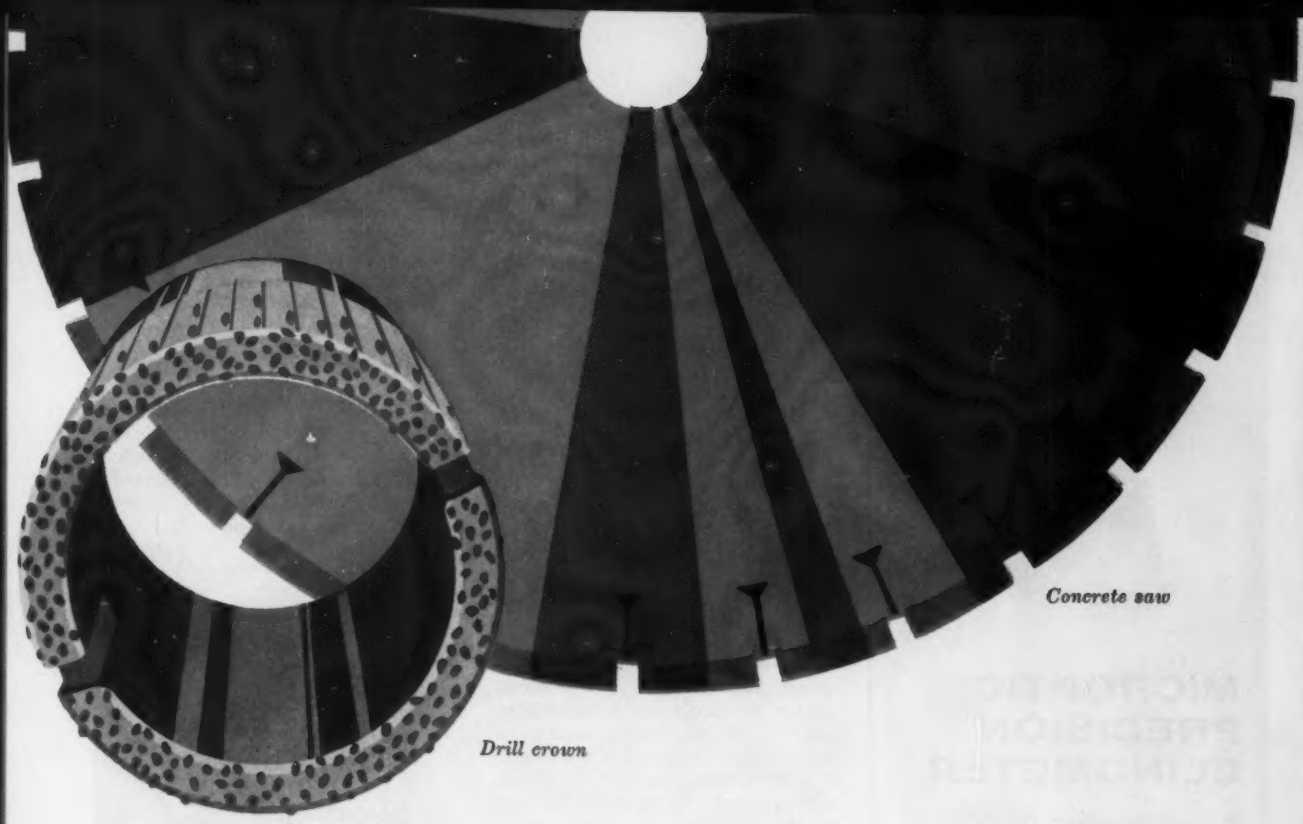
Grinding wheel



Engraving tool



Centering drill



Concrete saw

Drill crown

Just how inexpensive diamonds can be for you, depends on the job you're doing. You'll have to try them to know. The biggest companies in the country, the ones that watch costs most closely, use industrial diamonds consistently.

Next time you buy tools or wheels, try diamonds. Pit them against the cutting method you are now using. Chances are you'll find out how economical a diamond can be.

INDUSTRIAL DISTRIBUTORS (SALES), LTD., LONDON

Diamond shaping tool

INDUSTRIAL DIAMONDS CUT PRACTICALLY EVERYTHING . . .
ESPECIALLY YOUR PRODUCTION COSTS

ONE SECOND SENSITIVITY

to exactly set and check angles

MICROPTIC PRECISION CLINOMETER

Highly sensitive yet easily handled, the Microptic Precision Clinometer is designed for all calibration and machine setting purposes requiring the highest accuracy.

Angles through 360° are measured by referring the instrument base to the true horizontal — the inclination is read directly from the circle scale through a reading microscope. The eyepiece can be rotated to face in any direction. Interchangeable units permit daylight or artificial illumination of the reading system.

The Precision Clinometer is invaluable in setting inclinable tables for jig borers, and angular work on grinding and lapping machines; for checking angular faces and locations on jigs, fixtures and gages.

...New

Accessories—for use in horizontal position; to measure angular displacement of small parts; to comply with military environmental specifications for field use.

ENGIS
EQUIPMENT COMPANY
DIVISION OF ENGINEERING AND SCIENTIFIC INSTRUMENTATION
431 SOUTH DEARBORN ST.
CHICAGO 5, ILL.

Circle this page number on card

Skylines are available with solenoid- or air-operated heads, in-line and base-mounted, in straightway, three- and four-way types.

The series includes heads with spool and CT type solenoids. The Gold, Silver, and Green models and the Pacer Pilot are all JIC; the White model is non-JIC. Another Ross innovation, applicable to the Skyline series, is the air index, a double-stroke adapter that makes a single solenoid act like a double momentary. It can be used when a single control device will index a valve between two positions.

Circle 701 on Readers' Service Card

Surface Roughness Recording Instrument

Booths 418, 420, 422

The Micrometrical Mfg. Co., Ann Arbor, Mich., will exhibit a Microcorder, an electromechanical instrument which provides a permanent magnified chart record of the roughness profile of a surface. It is particularly useful for studying surfaces which are pitted, porous, have flaws, scratches, or other irregularities. The complete instrument consists of four units: a recorder, an amplimeter, a pilotor and linkarm, and a tracer and skidmounts. The recorder has horizontal sensitivities of 0.002, 0.004, and 0.010 inch per division, and records on a 4-inch chart that can be reproduced by conventional means. The amplimeter provides a magnification range of 250 to 50,000 times.

The pilotor, in conjunction with the linkarm, support the tracer and provide the tracing motion. The tracer measures displacements by means of a differential transformer type transducer. Maximum displacement of the diamond stylus is 0.016 inch. Over-all accuracy is within 3 per cent of full-scale reading.

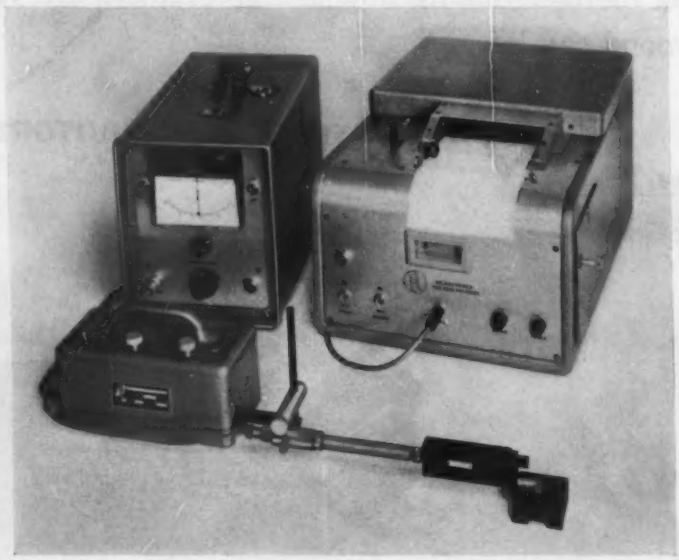
Circle 702 on Readers' Service Card

Weltronic Welding Control

Booths 464-466

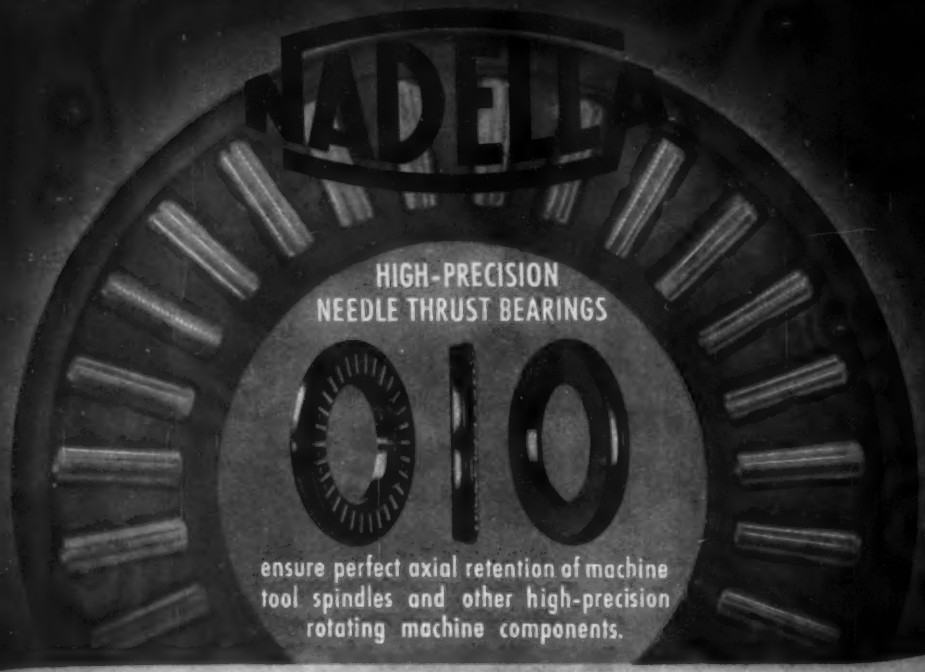
Weltronic Co., Southfield, Mich., will introduce an all-electronic NEMA N2 welding control designed for general use. It provides features normally furnished with special automotive type controls and can be

All-electronic welding control built by Weltronic Co.



Microcorder instrument for charting surface roughness

Deriving from well-known NADELLA Needle Thrust Bearings

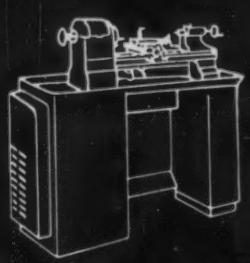

NADELLA
HIGH-PRECISION
NEEDLE THRUST BEARINGS
ensure perfect axial retention of machine tool spindles and other high-precision rotating machine components.

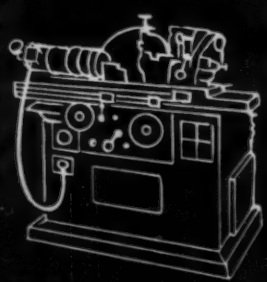
Exceptional Load Capacity
Outstanding Rigidity even under Variable Load
Normal Tolerance ± .00004"
(closer tolerances on request)
Bearing precision completely unaffected by centrifugal forces acting on rolling elements

These thrust bearings are suitable for all normal speed ranges, including high-speed machining by carbide and ceramic cutting tools. NADELLA Needle Thrust Bearings meet tomorrow's machining precision requirements today. You can safely put your trust in the traditional craftsmanship and skill of Swiss precision engineering backed by NADELLA's 30 years experience in the production of needle bearings. Complete range of metric sizes from 15 mm (19/32") to 120 mm (4 3/4").

Some typical applications where NADELLA super-precision needle thrust bearings have scored :

- **Precision lathe spindle**, mounted on 35 mm (1 3/8") i. d. NADELLA needle thrust bearings. Excellent surface finish, outstanding dimensional accuracy of machined faces, direct finishing to chosed tolerances.
- **Worm of indexing table for jigboring machine**, mounted on 40mm (1 9/16") i.d. NADELLA needle thrust bearings (ultra-precision grade). Indexing accuracy .00001".
- **Milling machine spindle**, mounted on 120 mm (4 3/4") i. d. NADELLA needle thrust bearings. Performance proved so satisfactory that preliminary rough machining passes produced a surface precision and finish equal to the finishing pass.
- **Work-holding spindle** of grinder, mounted on 50 mm (2") i. d. NADELLA needle thrust bearings. Complete absence of lateral movement and outstanding dimensional accuracy in surface grinding; excellent surface finish.





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SOLOTHURNSTRASSE 66/68 - **BIEL** (SWITZERLAND) TEL. 032-4.20.31

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FREE REFERENCE BOOK

All information about hardness testing in easy-to-read text with many illustrations. Just write "Send Book" on your letterhead. Description and prices for Clark Hardness Tester and free Hardness Conversion Chart also available on request.

CLARK INSTRUMENT, INC.
10204 FORD ROAD
DEARBORN, MICHIGAN

Missile-Age Accuracy

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used in high-speed applications. Optional functions such as slope, postheat, forge, and electronic firing of valve and contractor are all available as plug-in features. The controls are made as package units, completely wired and ready to install.

Circle 703 on Readers' Service Card

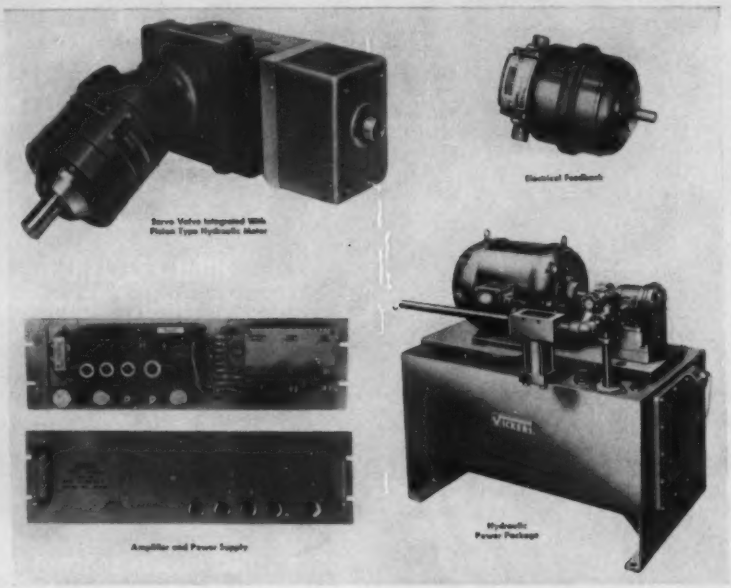

Servo Valve Integrated With Piston Type Hydraulic Motor
Electrical Feedback
Amplifier and Power Supply
Hydraulic Power Package

Fig. 1. Vickers buiding-block units for electrohydraulic servo systems

Vickers Hydraulic Power and Control Equipment

Booth 107

Vickers Incorporated, division of Sperry Rand Corporation, Detroit, Mich., will exhibit hydraulic power and control equipment for industrial machinery. A feature of the display will be building-block electrohydraulic servo systems (Fig. 1) that provide remote control for positioning and velocity. They consist of standard components preengineered into systems which permit the use of any electronic programming means now available—from a simple potentiometer control to a tape reader or punched cards.

Series SA4 electrohydraulic servo valves with flow rates that cover the range from 0 to 37 gallons per minute will be shown. These units feature high response and have good dirt-tolerance characteristics. A mechanical feedback linkage with a variable fulcrum provides flexibility to meet various conditions of flow, response, and pressure.

The hydraulic power package shown in Fig. 2 is complete with pump, adjustable relief valve actuating valves, and reservoir, all

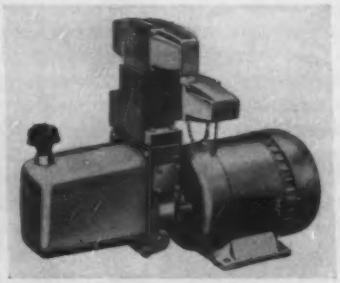


Fig. 2. Complete hydraulic power unit available with manual or solenoid directional valves

Fig. 3. Traverse and feed control panel for drilling, boring, reaming, and milling operations

Specify the

T-J Spacemaker

for longer, more efficient cylinder service

With Extras . . . At No Extra Cost

1. METAL PISTON ROD SCRAPER—protects rod packing, cylinder bore and rod surface by removing all foreign particles.
2. NEW "SUPER" CUSHION for air or METALLIC SELF-ALIGNING MASTER CUSHION for oil.
3. HARD CHROME PLATED CYLINDER BORES AND PISTON RODS for greater protection and reduced wear.
4. ONE PIECE PISTON assures better alignment, longer bearing and packing life.
5. FORGED SOLID STEEL HEADS throughout entire line.
6. PILOTED PACKING GLAND with extra long bearing for additional strength and support to piston rod.
7. NO TIE-RODS TO STRETCH—gives you 360° port rotation . . . less space used . . . full strength.
8. STREAMLINED DESIGN . . . operating pressures to 200 PSI, air; 1,000 PSI oil, non-shock.

You too—can reduce replacement expenditures—lower maintenance costs with the T-J Spacemaker cylinder line. Designed and engineered for ruggedness, and accuracy of operation, the Spacemaker assures longer, uninterrupted operation.

The T-J Spacemaker eliminates tie-rods, gives greater strength, saves space . . . and reduces costs in all push-pull operations. Immediate delivery in a complete range of styles and capacities . . . air or oil. Write for Bulletin SM 155-4, today. The Tomkins-Johnson Company, Jackson, Michigan.

T-J TOMKINS-JOHNSON
RIVITORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS

For more data circle this page number on card at back of book

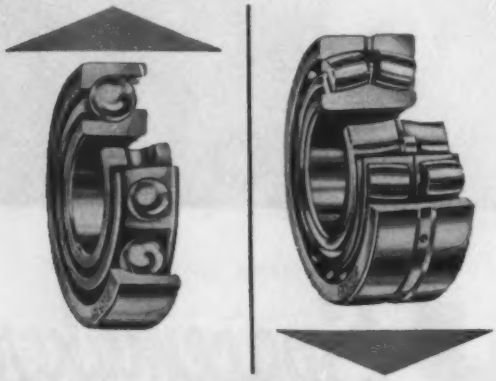
EVERY TYPE—EVERY USE
SKF
INDUSTRIES, INC., PHILADELPHIA 32, PA.

Spherical, Cylindrical, Ball, Tyson Tapered and REED Miniature Bearings

ANGULAR CONTACT BALL BEARING

This is the bearing to use when you need a high-speed bearing to support either (a) heavy thrust load, or (b) thrust load combined with radial load. It lends itself to various mounting arrangements. For example, if you need axial rigidity and high radial capacity you can mount two of these bearings in pairs either face-to-face or back-to-back. Or, if very high thrust capacity is needed, you can mount two or more of these bearings in tandem.

This standard bearing is available in over 80 sizes of single- and double-row types. Bore sizes range from ¾" to just over 7".



SPHERICAL ROLLER BEARING

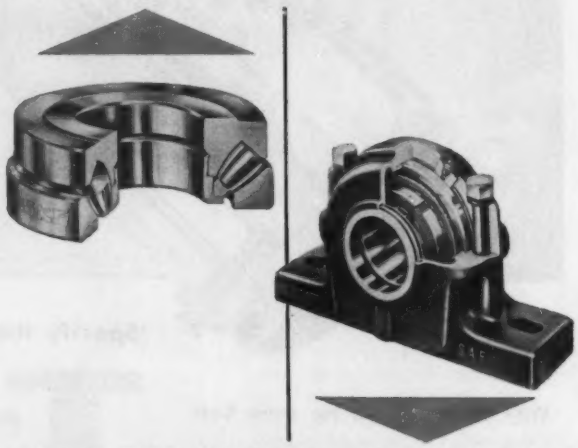
SKF invented the spherical roller bearing almost forty years ago. Since then, we've improved the original design several times—so that, today, our Type "C" spherical roller bearing offers longer life and 33⅓% greater capacity.

This increased capacity is largely due to the number, size and shape of the rollers—and the improved accuracy with which they're guided. Because these bearings are inherently self-aligning, their full capacity is always available for substantial thrust load in either direction as well as heavy radial load. These bearings also have special lubricating grooves that channel lubricants directly to the spherical rollers.

SPHERICAL ROLLER THRUST BEARING

Need a thrust bearing capable of carrying unusually heavy loads? Then specify this self-aligning spherical roller thrust bearing. It will carry either heavy thrust or combined thrust and radial loads. Because of its ability to carry high thrust at high speeds, this bearing is frequently chosen over large angular contact ball bearings for heavy-duty applications.

SKF makes this bearing in twenty-five standard sizes ranging from 4.3" to 14.9". And it's competitively priced.



TYPE SAF PILLOW BLOCK...with self-aligning ball or spherical roller bearings

Here's a rugged cast-iron pillow block that provides high efficiency with low friction.

We make this split pillow block with ball bearings for normal loads and with spherical roller bearings for heavy loads. We also equip it with Triple-Seal rotating rings that effectively protect the bearing from abrasives and corrosives, and prevent oil or grease from leaking out.

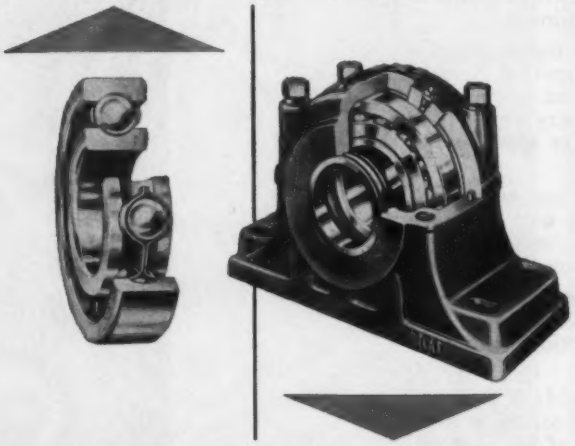
This pillow block can be mounted directly or with an adapter. Stabilizing rings are provided at no extra cost for applications where a "held" bearing is required to maintain shaft location. For heavy-duty applications, a cast steel housing (Type SAFS) is available. Shaft sizes from ¾" to 10½".

Only SKF can offer you unbiased bearing recommendations—because only SKF produces all four major types of anti-friction bearings: spherical, cylindrical, ball, and tapered roller bearings. For complete details on each type, just call the nearest of the twenty-four SKF sales offices.

SINGLE-ROW DEEP-GROOVE BALL BEARING

Here's a ball bearing that does two jobs, and does both of them well. It sustains heavy radial load as well as thrust load in either direction. Not only that, this bearing can be grease-lubricated when used at normal speeds and lubricated with oil at high speeds.

Yet this is a standard SKF bearing, mass-produced in various sizes at our automated Altoona (Pa.) plant. It's available in over 100 sizes ranging from over 5/8" O.D. to almost 16" O.D., and with various seal, shield and snap-ring combinations.



TYPE SDAF PILLOW BLOCK...with spherical roller bearings

Need an exceptionally sturdy pillow block? One that can withstand abnormal shock loads or heavy thrust loads day after day? Then specify SKF Type SDAF.

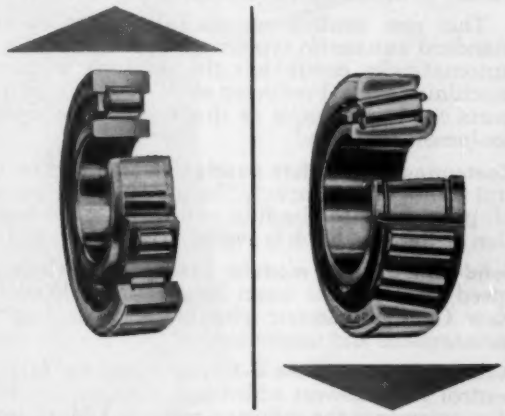
To provide maximum strength, four heavy bolts secure the cap of this pillow block to the base. Both halves are accurately aligned by dowel pins. And like the Type SAF, this pillow block comes equipped with Triple-Seal rotating rings that protect the bearing from foreign matter and retain the lubricant.

Type SDAF pillow blocks are made of cast iron but are also available in cast steel (specify Type SDAFS). They can also be mounted directly or with an adapter. Shaft sizes range from 2-11/16" to 14".

CYLINDRICAL ROLLER BEARING

Got a space problem? Here's a bearing that gives you high radial capacity—at very high speeds—in relatively small space. It's the SKF cylindrical roller bearing—which provides high radial capacity and minimum shaft friction. Controlled shaft end float within this bearing is a natural advantage of its design.

You can get prompt delivery in 154 bore sizes ranging from just under 1" to 6". Double-row cylindrical roller bearings are also available in bore sizes from 1" to 9.5".



Tyson® TAPERED ROLLER BEARINGS

What type of tapered roller bearing do you need: single-, double- or four-row? SKF's division, Tyson Bearing Company, makes all three of these types in a wide range of standard sizes.

The single-row type is especially suitable for carrying radial loads simultaneously. Double-row types are designed for use where the radial capacity of two single-row bearings is required. For special applications, the four-row type offers very high radial capacity in limited space.

All Tyson tapered roller bearings are interchangeable, size for size, with other makes of tapered roller bearings where the part numbers are the same.

SNP

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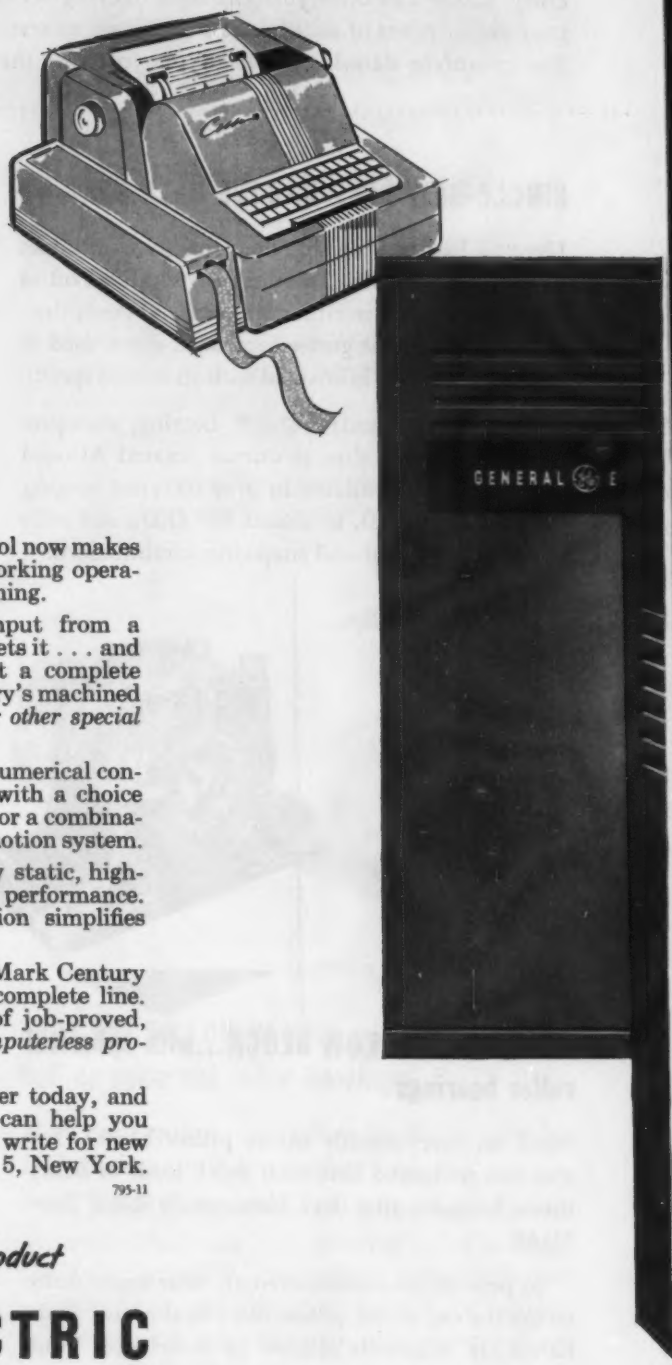
NOW...

automatic contouring without a computer



New General Electric Mark Century numerical control now makes *computerless programming* a reality for most metalworking operations . . . including all radial and straight-line machining.

This new control system takes punched-tape input from a standard automatic typewriter . . . reads and interprets it . . . and automatically commands the machine to carry out a complete machining cycle. Producing more than 85% of industry's machined parts can be as simple as that—*with no computer or other special equipment necessary!*

Contouring or absolute positioning—Mark Century numerical control comes in a compact, "building-block" package with a choice of: positioning to absolute co-ordinates; contouring; or a combination of the two. Each is available as a 2-, 3-, 4-, or 5-motion system.

Solid-state devices, modular construction—Completely static, high-speed logic circuits mean long life and dependable performance. New General Electric plug-in, modular construction simplifies maintenance and inspection.

Another member of the G-E program control family—Mark Century control is the newest addition to General Electric's complete line. It supplements the industry-renowned Mark series of job-proved, low-cost numerical positioning control to bring *computerless programming* to America's metalworking industry.

See your machinery builder or G-E Sales Engineer today, and find out how General Electric numerical control can help you increase productivity and cut machining costs. Or, write for new bulletin to General Electric Company, Schenectady 5, New York. Specialty Control Dept., Waynesboro, Va. 793-11

Progress Is Our Most Important Product

GENERAL ELECTRIC

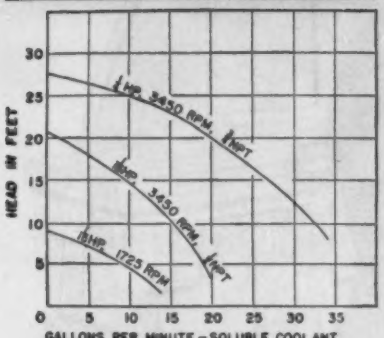
NEW MARK CENTURY

NUMERICAL CONTROL
FOR AUTOMATION

See General Electric numerical control at the Machine Tool Exposition and the Production Engineering Show, September 6—16, 1960, Chicago, Illinois.

NUMERICAL CONTROL

FOR MORE COOLANT PUMP ECONOMY*



*Performance Chart

Gusher
Sealess Type

Gusher flange mounted coolant pumps feature a simple design with no seals, no packing or priming necessary. They are designed to mount on the side of the reservoirs with either external or internal discharge. Immersed type also available.

Model 5-P

See Our Booth #376 Chicago Production Eng. Show

RUMACO
Seal Type

Rumaco pumps are seal type, centrifugal pumps that can be mounted in any convenient place. Precision built, Rumaco pumps give efficient, trouble-free operation. Seals are the best obtainable.

Model 5-S

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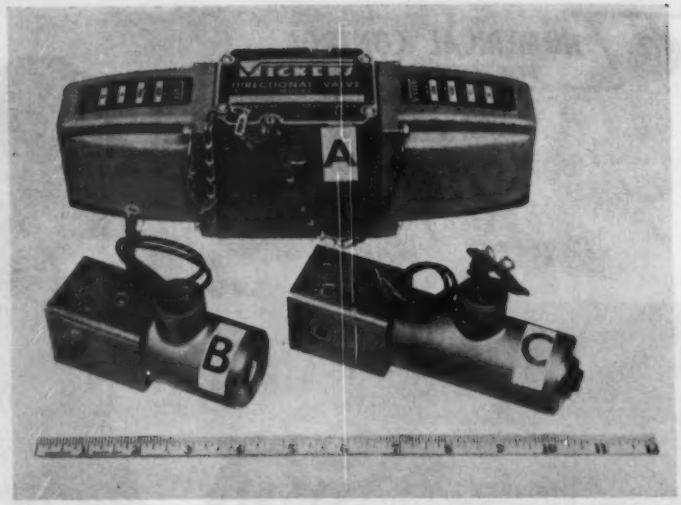


Fig. 4. Directional and miniature solenoid-operated control valves

mounted on an electric motor. This unit, which will be on display, is available with either manual or solenoid-controlled directional valves.

The exhibit will include a new traverse and feed panel (Fig. 3) that is a compact control unit for drilling, boring, reaming, and milling operations. It provides solenoid-controlled directional movements, and cam-actuated coarse- and fine-feed rates. Provision has been made for separating the mechanically actuated portion of the panel from the solenoid-controlled directional unit. This allows the panel to be mounted on the machine tool-slide and the electrical actuating control to be installed at a remote position.

Also to be shown are the adjustable deceleration valve described on page 250 of May, 1960, MACHINERY, and a series of vane type hydraulic pumps for use with water-base fire-resistant fluids. These pump units, which are suitable for operation at pressures up to 2000 psi, have low heat loss through slippage.

Directional control valves (item A, Fig. 4) with relatively high flow capacities feature air-cooled solenoids which provide quiet, cool, and shock-free operation. Oil-immersed solenoids are optional. New miniature valves of the gasket mounting type, rated at 1 1/2 gallons per minute and suitable for operation at pressures up to 2000 psi, are shown at B and C, Fig. 4. These units are available as four-way valves in both single-solenoid, spring-offset models and double-solenoid, spring-centered models. Solenoids with both a-c and d-c ratings are obtainable and optional-use cylinder ports have been provided for special applications.

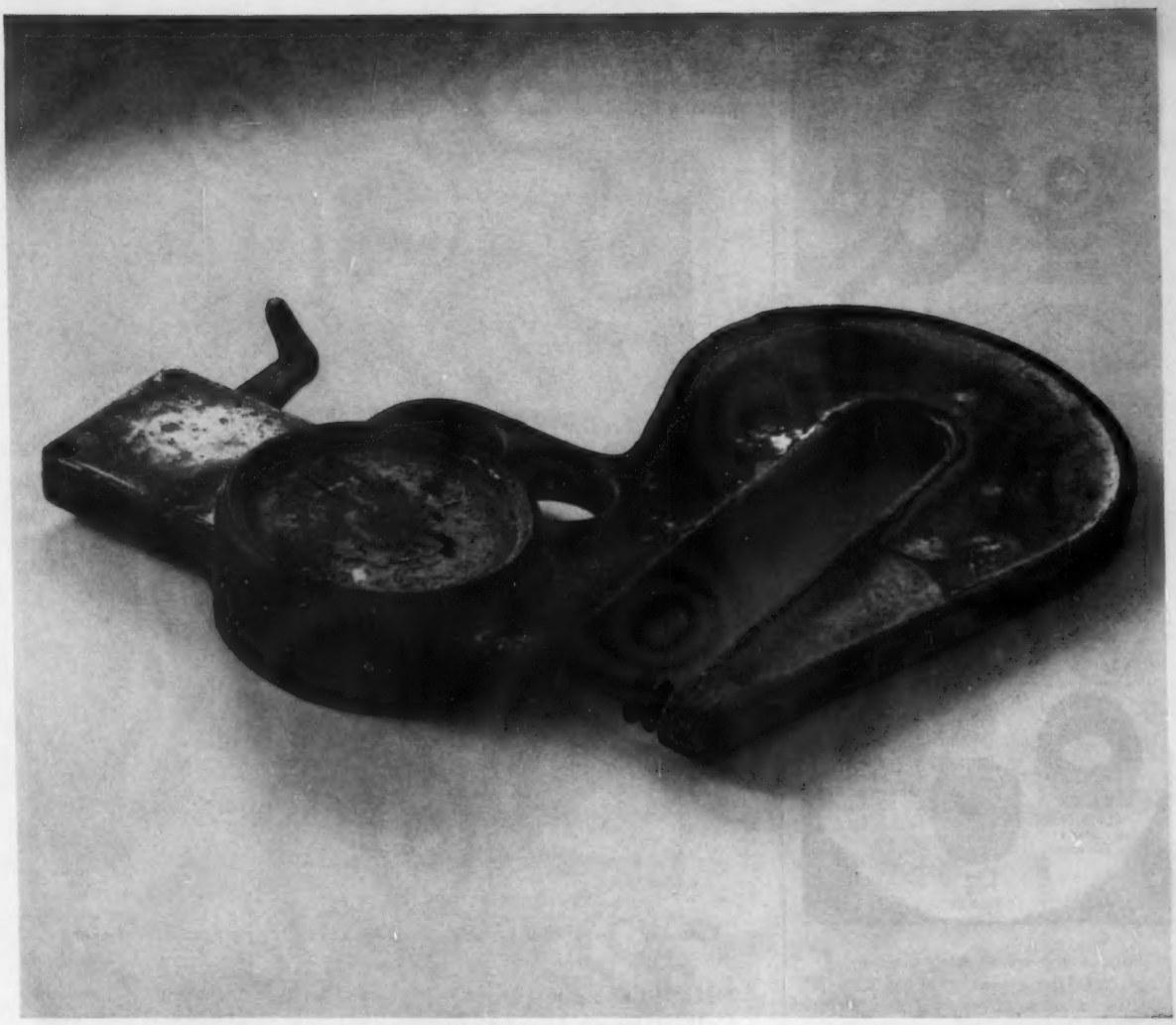
Circle 704 on Readers' Service Card

"Auto-Tap" Lead-Screw Tapping Head

Booth 247

A lead-screw tapping head that enables unskilled help to produce precision tapped holes on any drill press will be introduced by Ettco Tool & Machine Co., Inc., Brooklyn, N. Y. The compact unit, called "Auto-Tap," features a rapidly interchangeable lead-screw, a sensitive cone clutch running in oil, and a positive depth control that assures

"Auto-Tap" lead-screw tapping head will be exhibited by Ettco Tool & Machine Co., Inc.



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There had been no accident.

This Federal thickness gage — baked to a crisp, dial obliterated, crystal gone, hand bent, parts missing, was still on the job checking hot sheets in the rolling department when it was returned for renovation.

No accident that it could still do its job under conditions that would have long since retired a lesser gage. Proper design and good workmanship give Federal gages the workhorse durability that makes them regularly outperform and outlast other gages.

Quality is so important in gaging. Relying on design and experience is much more economical than buying on price.

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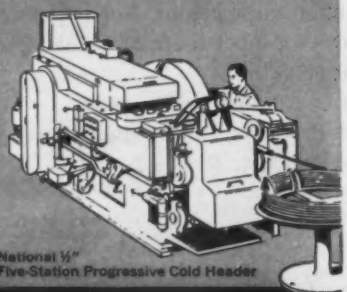
These important parts are cold-formed from wire, start to finish in compact, efficient National Cold Headers.

Practically scrapless, all these parts achieve remarkable savings over past methods.

If you make odd-shaped parts, may we help you evaluate them for cold-forming from wire? Better yet, come to Tiffin, witness our demonstrations and let's discuss your work.



National ½" Five-Station Progressive Cold Header

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U.S.A.

HARTFORD DETROIT CHICAGO

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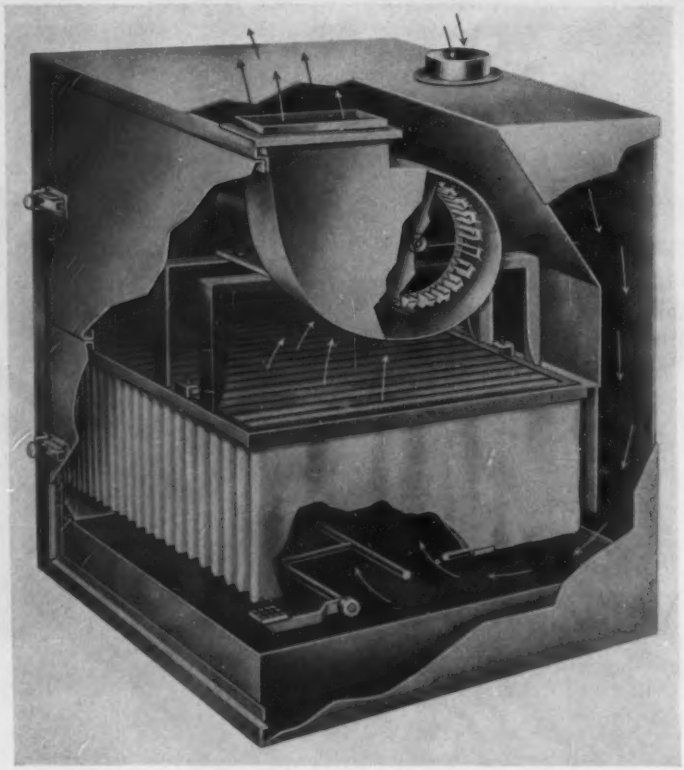
perfect threads even in blind or recessed holes. The hardened, precision-ground lead-screw runs in a special-alloy bronze nut that is adjustable to compensate for wear. A Rubber-Flex collet centers taps accurately in relation to the lead-screw.

Circle 705 on Readers' Service Card



Cutaway view of dust collector showing manually operated filter shaker

High-Efficiency Dust Collectors on Display in Torit Booth

Booth 401

The latest plant dust collection equipment will be demonstrated by Torit Mfg. Co., St. Paul, Minn. Applications for the units are expanding because they improve plant efficiency through protection of employe health, production machinery, and product quality. A power filter shaker accessory now facilitates maintenance of the units.

Compact and self-contained, the company's cabinet collectors are available in a variety of standard and custom sizes for use where removal of gritty dust is required, such as near sanding, grinding, and metal sawing operations. Air cleaning efficiency of these units is a result of their specially woven cloth filters. The filtered air can be recirculated in production areas to provide savings in fuel costs during the heating season.

All working parts are housed in heavy, air-tight steel cabinets, and are accessible through removable doors. Their economical and quiet operation is augmented by the safety afforded by chemically treating the filters to resist electrostatic sparking.

Circle 706 on Readers' Service Card

Friden Flexowriter and Code-Converter

Booth 334

Friden, Inc., San Leandro, Calif., will exhibit a Flexowriter and introduce a tape-to-tape code converter. The Flexowriter for numerical control produces and verifies punched tape used in machine tools for both point-to-point positioning and continuous path contouring. A Model NC-1 will be available at the Show to prepare tapes for numerically controlled machine tools.

The tape-to-tape code converter automatically, and at high speed, reads one code on five-, six-, seven-, or eight-channel punched tape; and simultaneously converts it to another code on five-, six-, seven-, or eight-channel punched tape. It han-

Two NILES 84 in. lathes rough-turning mill rolls in shop of large Eastern steel mill. Powered by 200 hp motors, these machines can handle pieces up to 46 ft. long.

When BIG pieces need PRECISION turning NILES means PRODUCTION

For more than a century the NILES nameplate has been affixed to fine production machine tools, including some of the largest lathes and turning machines built in this country. This experience, continuously upgraded by unrelenting research and modern technology, has resulted in the design and manufacture of lathes with largest capacity and with versatility to handle jobs requiring precision turning of the highest order. Features of the above NILES Lathes, all built for exacting workmanship on big pieces, include:

- Five hardened and ground steel ways supported by a box-section longitudinally and cross-supports cast integral with the bed. All carriage-way mating surfaces with bronze liners.
- Headstock with a straight face-plate drive and two ranges of spindle speeds: low, 1-20 rpm; high, 20-80 rpm. Spindle speeds infinitely variable within each range.
- Tailstock antifriction live center which can be locked against rotation and used as dead center. Tailstock quill is hydraulically springloaded and adjustable to suit load conditions and allow for linear expansion of the workpiece.
- Modern electronic feeds permit variable feed rates. Mechanical feeds are provided for thread cutting.
- Taper attachment is adjustable longitudinally by means of gearmotor engagement of rack and can be used independently with any carriage.

For fast, accurate turning, boring, milling or planing, turn to NILES. Lathes in sizes from 50 in., boring mills from 14 ft., planers and planer-mills from 10 ft. Expanded facilities at our new Industrial Equipment Division assure finest workmanship and good deliveries. Write Dept. MT.

You don't baby a NILES—it's no baby

BALDWIN · LIMA · HAMILTON

Industrial Equipment Division, Philadelphia 42, Pa.

SEE US AT BOOTH 1226,
NATIONAL MACHINE TOOL BUILDERS ASSOCIATION

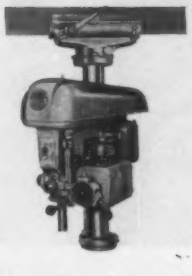
NEVER BEFORE—UP FRONT CONTROL WITH ONE HAND OPERATION

Unique pilot wheel control is mechanically integrated with the clutch control, allows operator to engage power feed with a simple wrist movement of one hand. Without any adjustments, operator can use rapid manual approach then power feed, skip drilling technique, straight power feed or straight manual feed. There are four feed ratios—.004, .006, .009 and .012 ipr—with each of five available spindle speeds.

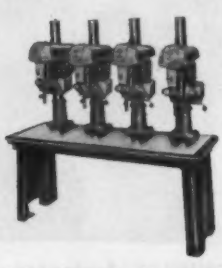
NEVER BEFORE—SUCH A COMPLETE CHOICE OF MODELS

Floor model

Bench model



Overhead model

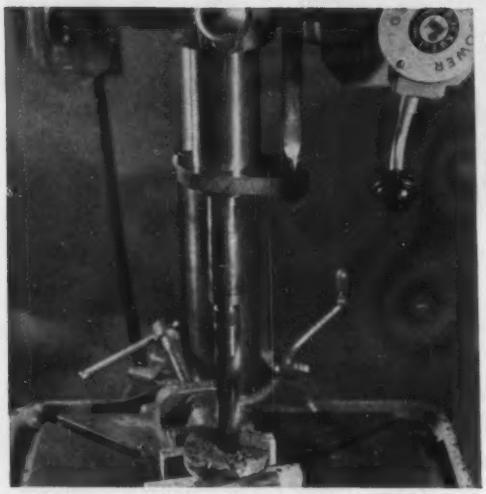


Multiple spindle model

ROCKWELL ANNOUNCES . . .

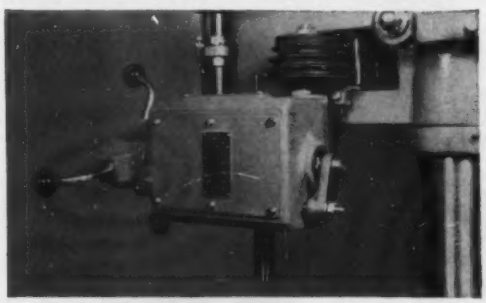
NEW POWER FEED

on famous DELTA 20" drill presses



NEVER BEFORE—"JOB TAILORED" DRILL POINT PRESSURE

A lathe-type cone clutch enables operator to adjust drill point pressure from 0 to maximum capacity of machine to permit power feeding on a production basis through a wide range of hole diameters. It furnishes power and thrust for drilling holes up to 1", yet delicately handles drills down to 1/16" diameter. Torque sensitive adjustability feature stops feed when overloaded—avoids drill breakage.



NEVER BEFORE—REMOTE CONTROL AND AUTOMATION

Actuating plunger, an extension of the clutch shaft, permits remote control which frees operator from manual effort. The power feed can be electrically, hydraulically, pneumatically, or mechanically interlocked with other machines or synchronized with devices such as rotary tables, clamps and work feeds for semi or full automatic operations.

Now Delta brings you advantages NEVER BEFORE AVAILABLE on a standard drill press—with the most advanced development in mechanical power feeds. Every model in the new Delta 20" drill press line offers power feed that gives you: *a front mounted pilot wheel for effortless one hand operation; infinitely adjustable drill point pressure; built-in feature that permits remote control or interlocking with automation devices.*

With the flexibility of feeds afforded by "flick of the wrist" control, operator's work is limited to loading, unloading, and actuating the tool. You get the adaptability of a power tool with the ruggedness, precision and capacity of a machine tool. Capable of handling production metalworking jobs done by machines costing much more, these new Delta power feed drill presses provide a simple, low cost method of increasing productivity and improving drilling quality.

Thoroughly tested through a rugged trial of 750,000 drilling cycles, Delta's new power feed line offers many other outstanding features and NEVER BEFORE AVAILABLE benefits that you cannot appreciate unless you see them demonstrated IN ACTION. Let your Delta Industrial Distributor show you how the 20" power feed drill press can help you cut costs (he's listed under "TOOLS" or "MACHINERY" in the Yellow Pages). Meanwhile, for FREE brochure giving details and specifications *plus* information on how to add New Power Feed to your present Delta 20" drill press, write: Rockwell Manufacturing Company, Delta Power Tool Division, 614J N. Lexington Avenue, Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Box 420, Guelph, Ontario.

BE SURE TO REGISTER AND VOTE

DELTA INDUSTRIAL TOOLS

another fine product by

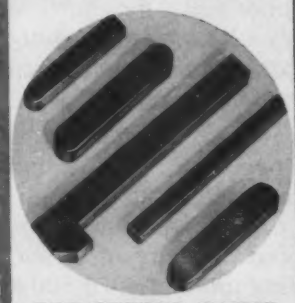
ROCKWELL

GILLEN

One Source for

KEYS AND SPECIAL PARTS

MACHINE PARTS



MACHINE KEYS

WOODRUFF KEYS

Gillen has the years of skill and experience in meeting the precise specifications of machine builders for keys and special parts of every type, size and shape.

Send prints for complete data & prices.

JOHN GILLEN COMPANY
subsidiary of
STANRAY CORPORATION
2552 South 50th Avenue
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EVERY TYPE OF KEYING AND PINNING DEVICE FOR PRODUCTION ASSEMBLING

PIVOTS • BUSHES • TENSION, TAPER, GROOVE & DOWEL PINS • MACHINE KEYS & PARTS

GILLEN

Friden code converter and Flexowriter in a combined operation

dles the unique characteristics of each code and at the same time automatically checks conversion.

Any data in an eight-channel tape being produced by a Friden Flexowriter automatic writing machine can be wire-transmitted by automatically repunching codes in five-channel tape on the code converter. At the receiving end of the line the codes may be converted back to eight-channel again, or even six- or seven-channel. By means of a plug type control panel, consisting of 832 double-outlet hubs or patch points, the code converter is preset at the factory according to particular input-output requirements.

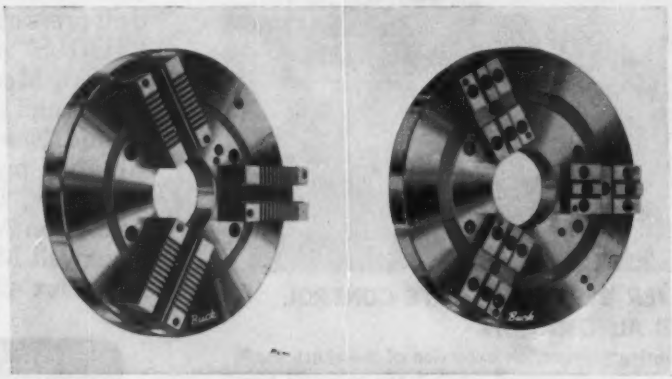
Tapes are read at 1180 codes per minute, and widths of 11/16, 7/8, or 1 inch are acceptable. Simple adjustments are incorporated for changing one width to another. Parity check is a standard feature, as well as a built-in code check to insure that an output code is punched for every code read.

Circle 707 on Readers' Service Card

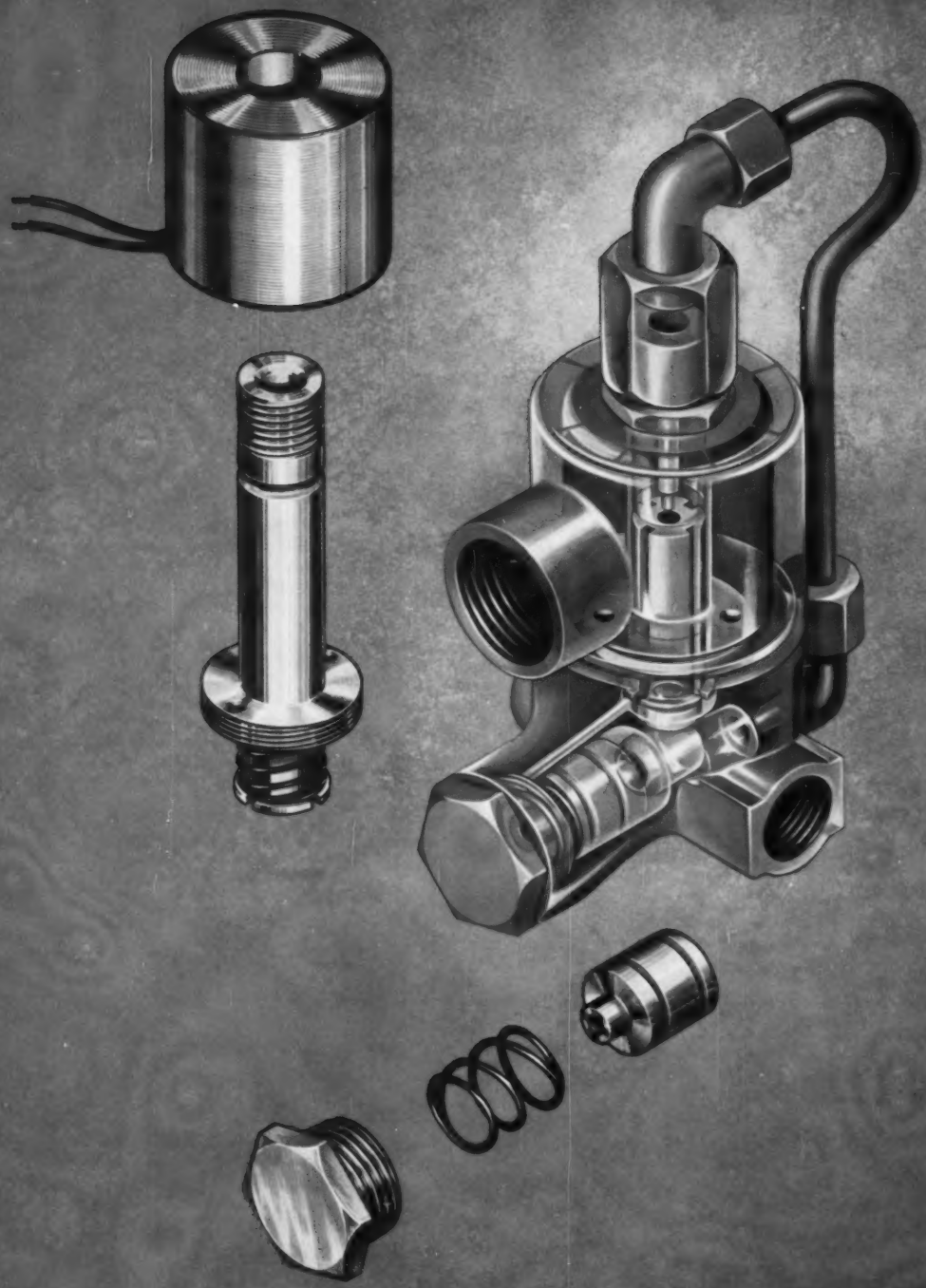
Buck Shows System Using Top-Jaw Turning Fixtures

Booth 244

The latest Ajust-Tru chuck and two different power chuck jaw-turning fixtures will be demonstrated at the Navy Pier booth of Buck Tool Co., Kalamozoo, Mich. The chuck (18 inches in diameter), like others



Top-jaw turning fixtures (accurate to 0.001 inch) take power chuck jaw turning off production machines and put it into the toolroom

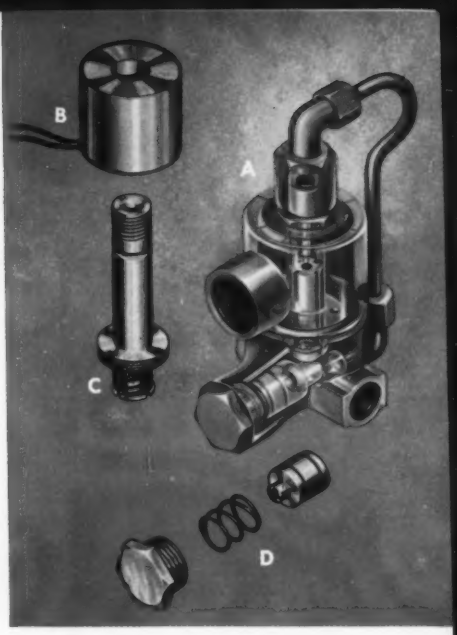


SKINNER 2-way Solenoid Valves

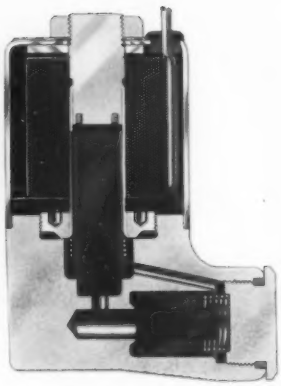
for high flow, high pressure applications

Here's how Skinner two-way valve design provides long lasting, trouble-free operation

- **Underwriters' Laboratories approved**
- **Stainless steel internal parts resist corrosion**
- **Forged naval brass body**
- **Famous Skinner V5 solenoid operator**
- **Well rounded main orifice and pilot seats**



A—Transparent view of normally open 2-way R type valve with piped pilot exhaust return
B—Coil C—Sleeve, plunger and spring assembly
D—Piston assembly with soft synthetic insert



NORMALLY CLOSED TYPE R2

When you have high-flow control problems at standard or high pressures the new Skinner two-way R series valves may be the answer. These pilot-operated solenoid valves are designed for use with air, oil, water, inert gases and other common media at operating pressure differentials of 5 up to 1250 PSI. They may be used for all types of control applications, such as: in high-pressure lifting, commercial laundry equipment, machinery, machine tooling, spraying, etc.

Skinner R series two-way valves have forged naval brass bodies to provide a dense metal structure and use a foolproof stainless steel piston with soft synthetic insert to open and seal the main orifice. Types are available normally open or normally closed, in standard and explosion-proof construction.

To make installation easy for every application, a wide choice of electrical housing options is available. These include JIC, AN connector, automotive terminals, etc. All housings can be rotated 360°. Manual override is also offered to permit manual opening of normally closed valves, or closing of normally open valves, in emergency.

Skinner R series valves may be used with all common voltages and frequencies and there are several coil types such as: varnished, molded waterproof, tropicalized and high temperature for specific applications.

The R series, illustrated here, is just one in a complete range of 2-, 3- and 4-way Skinner solenoid valves.

TWO-WAY R SERIES SPECIFICATIONS

Types	R2 XR2	R2H XR2H	R2H6	RP1 XRP1
Position	Normally closed	Normally closed	Normally closed	Normally open
Pipe Size (NPTF Dry Seal)	¼"	¼"	¼"	¼"
Orifice Size	¼"	¼"	¼"	¼"
Cv Factor	.758	.758	.758	.758
Operating Pressure Differential (PSI)				
Minimum	5	5	5	5
Maximum AC Service	200	1250	—	150
Maximum DC Service	200	500	1000	150
Leakage	Bubbletight	Bubbletight	Bubbletight	Bubbletight
Temperature Range (Ambient and Media)	Minus 40°F to plus 180°F	Minus 40°F to plus 180°F	Minus 40°F to plus 180°F	Minus 40°F to plus 180°F

When you specify solenoid valves, specify Skinner.

Skinner solenoid valves are distributed nationally.

For complete information, contact a Skinner Distributor listed in the Yellow Pages or write us at the address below.

SKINNER ELECTRIC VALVES

THE CREST OF QUALITY

SKINNER ELECTRIC VALVE DIVISION,
THE SKINNER CHUCK COMPANY • NEW BRITAIN, CONNECTICUT, U.S.A.

PRINTED IN U.S.A.

With A-L's Tool Steel Steelector System

You Check Warehouse Availability Right At Your Own Desk

How often have you wished that you could bring the tool steel warehouse right to your desk so that you could see what grades and sizes and shapes are available immediately?

The new Allegheny Ludlum STEELECTOR Program does virtually just that. Special Data Stock Lists (18 of them) for each STEELECTOR Grade specify the complete necessary range of sizes and shapes available that will suit virtually all applications. They also list the working hardness of typical applications, temperatures for hardening, tempering, and annealing, plus other data.

You can count on the availability of STEELECTOR Grades. Mill depot and warehouse stocks have been selected and arranged to take the pressure off your own inventory. With the STEELECTOR Program you can select tool steels almost at a glance and be sure that the steel you have picked is in stock—ready for delivery—before you place your order.

Three STEELECTOR Cards make it easy to choose the proper steel for your application. The cards cover tool room, hot work, and high speed grades. The properties of the STEELECTOR Grades are shown by bar graphs for abrasion resistance, toughness, size stability, machinability, and red hardness. You can pick the grade with the particular combination of properties you need just by glancing at the graphs.

The colorful Tool Steel STEELECTOR Booklet gives complete details of the program, explains the Data Stock Lists, and includes the three STEELECTOR Cards. Ask your Allegheny Ludlum sales representative for your copy, or write: *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania. Address Dept. M-9.*

STEELECTOR PROGRAM

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country

1999

For more data circle this page number on card at back of book

UNIVERSAL JIG AND FIXTURE COMPONENTS AND CLAMP ASSEMBLIES

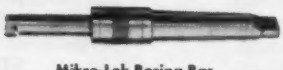
Shown here are a few of more than a thousand different items in regular steel and stainless steel —the largest and most complete selection in the United States—now available from Universal Engineering Co. Write today for your copy of the complete, new catalog.

213

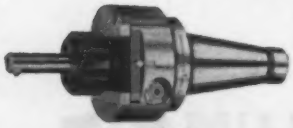
OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS

Floating Chuck

Standard Collet Chuck



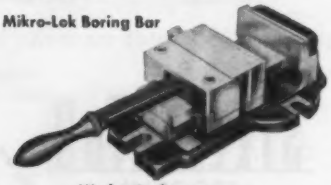
Mikro-Lok Boring Bar



Boring Chuck

"Kwik-Switch" Tool Holder

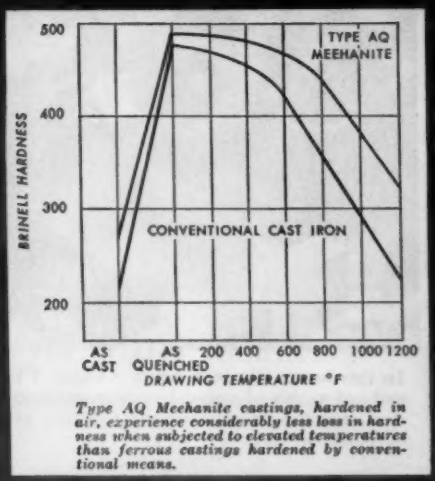
Standard Drill Bushing



Wedge-Lock Production Vise

UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 2, MICHIGAN

NOW DIMENSIONAL TOLERANCES CAN BE HELD ON HARDENING



Type AQ Meehanite castings, hardened in air, experience considerably less loss in hardness when subjected to elevated temperatures than ferrous castings hardened by conventional means.

NEW AQ MEEHANITE® . . . keeps distortion to a minimum

AQ Meehanite® is a tough, wear and abrasion resisting material which can be cast to a machinable hardness and air hardened after machining to high Brinell values with little or no distortion, even in massive castings. An outstanding advantage of this new metal is its ability to be locally hardened for improved wear resistance. As no water quenching is required, few stresses are produced and dimensional tolerances can be held closely. This is particularly important for such parts as dies, punches, cams, rollers, etc.

Type AQ Meehanite is ideally suited for hot forming dies and other parts required to work at elevated temperatures because it maintains its high hardness even when heated. For this reason, AQ Meehanite castings can be expected to provide good wear resistance where conventional flame hardened parts may soften under repeated temperature influence. See chart above. Large castings can be fully hardened . . . simply . . . economically . . . without oil bath equipment . . . and without dangerous distortions.

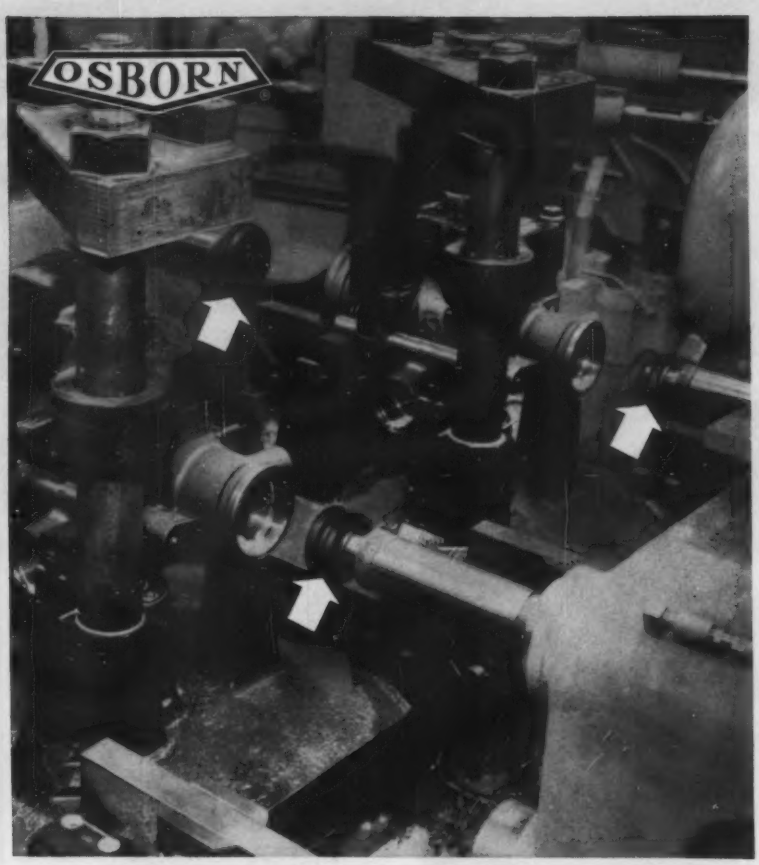
Free literature is available on AQ Meehanite. Write to the Meehanite Metal Corporation or contact the nearest Meehanite foundry.

You'll like doing business with a Meehanite foundry.

MEEHANITE METAL

The American Laundry Machinery Co., Rochester, N. Y.
Atlas Foundry Co., Detroit, Mich.
Banner Iron Works, St. Louis, Mo.
Barnett Foundry & Machine Co., Irvington, N. J.
Casting Service Corp., LaPorte, Indiana and Bridgman, Michigan
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover, Ohio
Compton Foundry, Compton, Calif.
The Cooper-Bessemer Corp., Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co., Portland, Ore.
Dayton Casting Co., Dayton, Ohio
Empire Foundry Co., Tulsa, Okla.
Florence Pipe Foundry & Machine Co., Florence, N. J.
Fulton Foundry & Machines Co., Inc., Cleveland, Ohio
General Foundry & Mfg., Flint, Mich.
Georgia Iron Works, Augusta, Ga.
Greenlee Foundries, Inc., Chicago, Ill.
Hamilton Foundry Inc., Hamilton, Ohio
Johnstone Foundries, Inc., Grove City, Pa.
Kanawha Manufacturing Co., Charleston, W. Va.
Kennedy Van Saun Mfg. & Eng. Corp., Danville, Pa.
Lincoln Foundry Corp., Los Angeles, Calif.
Oil City Iron Works, Corsicana, Texas
Palmyra Foundry Co., Inc., Palmyra, N. J.
The Henry Perkins Co., Bridgewater, Mass.
Pohlman Foundry Co., Inc., Buffalo, N. Y.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ross-Meehan Foundries, Chattanooga, Tenn.
Sonith Foundries of FMC, Indianapolis, Ind.
Standard Foundry Co., Worcester, Mass.
The Stearns-Roger Mfg. Co., Denver, Colo.
Vulcan Foundry Co., Oakland, Calif.
Washington Iron Works, Seattle, Wash.
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hartley Foundry Div., London Concrete Machinery Co., Ltd., Brantford, Ontario
Otis Elevator Co., Ltd., Hamilton, Ontario

MEEHANITE METAL CORPORATION, NEW ROCHELLE, NEW YORK



In this automatic twin setup, Osborn TY® brushes are advanced into both ends of a pair of valve housings without surface contact. The drive head oscillates the brushes around the ring groove contours, then retracts . . . all automatically.

HIDDEN BURRS knocked off

in 5½ seconds with new OSBORN TY® Power Brushes

This large manufacturer of automotive power steering equipment uses Osborn TY® brushes to deburr double internal ring grooves in both ends of these valve housings. Former off-hand methods required lots of time . . . effort. Still, high quality standards were hard to obtain.

Today deburring is done automatically with Osborn TY brushes . . . in just 5½ seconds. *High quality results are uniform . . . consistent.* These tough, durable TY brushes operate 16 hours a day in a 96-station automatic transfer machine. Even in this rugged service, brush life runs 2½ to 3½ weeks.

An **O**sborn **B**rushing **A**nalysis—made in your plant now at no cost or obligation—is the first step toward improving your metal finishing operations of every description—deburring, cleaning, polishing, precision blending. Write or phone for details. *The Osborn Manufacturing Company, Dept. D-60, Cleveland 14, Ohio.* Phone ENdicott 1-1900.

PRODUCTION ENGINEERING SHOW 1960

OSBORN BOOTH 375-377

Osborn Brushes

Metal Finishing Machines . . . and Finishing Methods

Power, Paint and Maintenance Brushes • Foundry Production Machinery

in the line, has an aluminum body that affords a 40 per cent saving in weight, and gibbed keyways for taking up wear.

Illustrated are two different top-jaw turning fixtures used in a new chuck jaw maintenance system to be demonstrated. On the left is the serrated master version, and on the right is the fixture for American Standard tongue and cross-key jaws. The maintenance system is designed to eliminate the loss, in down time, of turret and chucking lathes when power chuck top jaws are turned and trued in the conventional manner on the actual production machine spindles.

In the new system jaws are prepared in sets for the production machines by the toolroom. When a given set becomes worn, it is returned for repair or turning to a larger work size. A fresh set of top jaws is always ready to be put into the chuck. After insertion only a rapid, light finish-turning or grinding cut is needed under full air pressure to achieve final precision adjustment for production.

Circle 708 on Readers' Service Card

New Tape Control, Drives, and Components Highlight General Electric Display

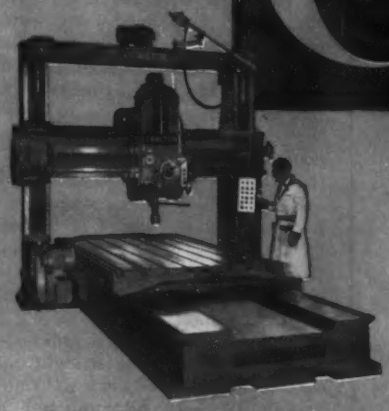
Booth 110

The General Electric Co. (Schenectady, N. Y.) exhibit at Navy Pier will stress "progress in the design and manufacture of electrical equipment and systems for machine tools." The display will have three sections: numerical control, components, and drives.

A new numerical control system for metalworking machines, which

Bellows type industrial pressure switch for pilot-duty applications to 300 psi on machine tools

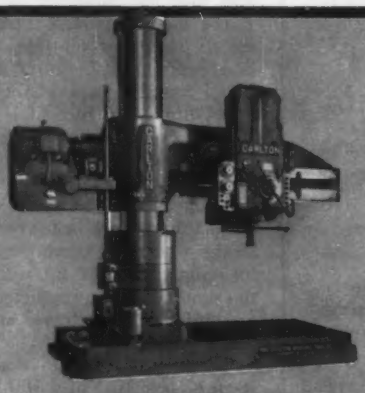
Carlton



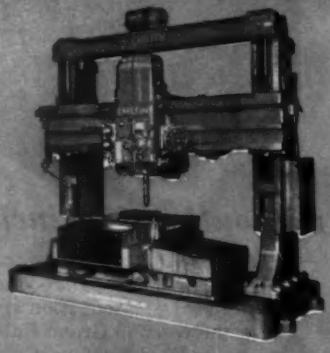
NEW PLANER TYPE BORING AND DRILLING MACHINE with numerically controlled automatic positioning. Accurately locates work for boring, reaming, drilling, tapping.

HORIZONTAL DRILLS now with numerical control . . . for tape, keyboard or pushbutton control. Allows any shop to automate boring, drilling, reaming, tapping.

See these new Carlton machines at the machine tool show



RADIAL DRILLS. The best known, most highly respected and widely used radial drills. Made in column diameters from 9" to 26", arm lengths from 3-ft. to 12-ft.



NEW VERTICAL DRILLING MACHINE with automatic positioning (or spacing) table. Introduces jigless heavy duty boring and drilling, puts it on a production basis for the first time.

NOW: NUMERICAL CONTROL by Carlton Controls Corp. for Carlton 4H and 5H horizontal drills and for Model ARS planer type boring and drilling machine. Write for complete information.

MMT-PE **VISIT CARLTON BOOTH 849**

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO / *Specialists in boring and drilling machines since 1916*

ACCURACY
ACCURACY
ACCURACY

. . . to millionths of an inch

Accuracy that's a must for tool rooms . . . so fine it can be measured only by a light bounce, so precise it produces micro-inch finishes at production speeds. This is the accuracy you get in the No. 560 Grand Rapids Precision Tool Room Type Hydraulic Feed Surface Grinder . . . accuracy assured by such features as hand-scraped V-shaped ways, rigid one-piece column and base casting, truly automatic cross feed and extra-heavy spindle. Why settle for less?

For information on the No. 560 or the Nos. 550, 360 and 350 Tool Room Type Surface Grinders, send a note on your letterhead.

GALLMEYER & LIVINGSTON

Booth 751
The Machine
Tool Exposition

MMT-PE

GALLMEYER & LIVINGSTON CO.
305 Straight Ave., S.W. Grand Rapids, Michigan

will make punched-tape programming as simple and economical for contouring operations as for standard positioning, will be featured. This control system was announced by the company August 15. Called the "Mark Century" control, an addition to the existing "Mark" series of packaged controls, it represents the most advanced engineering achievement in G-E's punched-paper-tape control of machine tools.

General Electric engineers expect the new control system to reduce the cost of automatic contouring control to levels considerably below those of the present, because it will make possible quick, simple programming of a majority of contouring operations directly from engineering drawings. It bypasses the need for expensive and lengthy computer interpolation. Also the need for a computer is eliminated on jobs involving only straight cuts, slopes, and arcs of circles. Control manuscript may be prepared directly from engineering drawings, ready for a typist to punch the finished program using a standard tape perforating typewriter.

A new complete line of miniature oil-tight industrial push-button units, that permit at least a 40-per cent reduction in panel space requirements, will be exhibited. These are about half the size of existing heavy-duty industrial push-buttons and may be mounted as close as 1 1/4 inches apart. Despite the reduced size, this oil-tight miniature line offers the operating and functional forms now available only in heavy-duty construction.

The recently-announced cast-iron, snap-action foot-switch for applications requiring operation of a machine or process cycle while operator's hands are in use will be one of the operating displays. Designed for control of up to four circuits, the new switch has sufficient weight to minimize floor travel and tilting while operating.

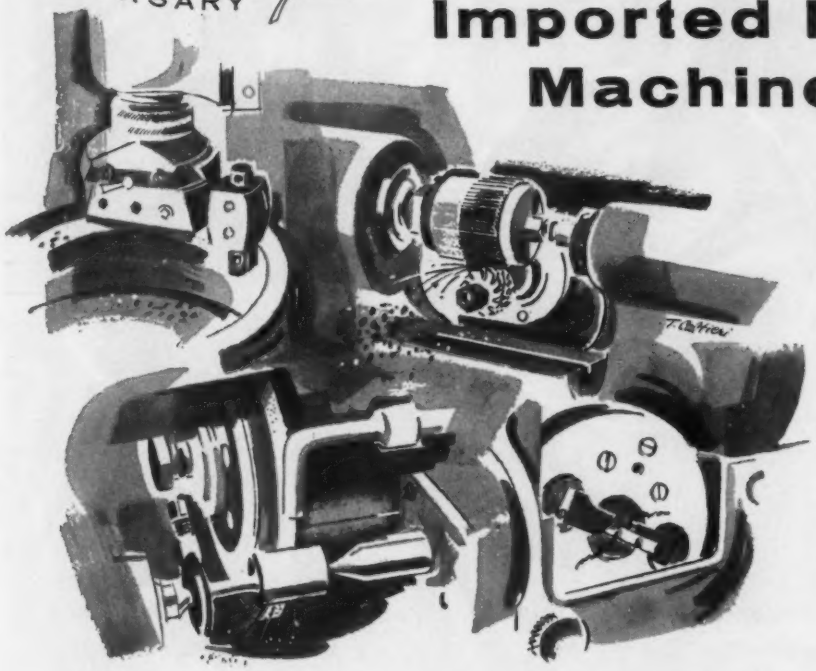
The new "100-line" combination starter, consisting of a 100-line magnetic motor starter, control transformer, and branch circuit protective device (disconnect switch or circuit breaker), will be displayed. Designed to meet rigid safety requirements, it will help prevent unauthorized or careless maintenance with resultant danger to personnel.

Thermo-Tector motors, with a new kind of motor overload protection, will also be shown. Protection is provided by two or more miniature heat-sensing switches buried in the stator windings. The switches, connected in series with conventional motor control, shut the motor off whenever the internal winding

For more data circle this page number on card at back of book

20th ANNIVERSARY COSA

Your Largest Selection of Imported Precision Machine Tools



See them in operation—Booths 117 & 653

Coliseum Machinery Show—Sept. 7-15

Cosa will exhibit many of the latest designs in Precision Production Machine Tools. Featured in Booth 653, you will see a new **Deckel LK** with interchangeable heads for Jig Boring and Jig Grinding. There will be a new Coil-fed **Escomatic D-4** form-turning machine, automatically producing small precision parts—centered and drilled to reduce secondary operations. A **Schenck R06** Balancer, with autocycling, will precisely balance small parts revolving at 10,000 to 30,000 rpm. Two **Studer** Universal and Cylindrical Grinders, models RHU 450 and RM 250L, will grind parts to extremely close tolerances. Both Studers can be equipped with O.D. grinding and match grinding measuring devices for automatic sizing, spark-out control and machine shut-off. The RM 250L, a one-lever controlled grinder, is being shown for the first time in this country. A **Koepfer** Gear Hobber 170 for automatic production of various types of gears will also be demonstrated.

In Booth 117, two **Trumpf** Universal Sheet Metal Working Machines will demonstrate copy-nibbling, many curve cutting and forming operations.

Expert technicians will demonstrate these machines and provide information on the entire Cosa line, listed at the right.

CHECK COSA'S COMPLETE LIST FOR YOUR TOOLING NEEDS

- Balancing Machines
- Bending and Forming Machines
- Boring Machines
  - Boring, Milling
  - Horizontal
  - Jig
  - Special
  - Vertical
- Chucking Machines
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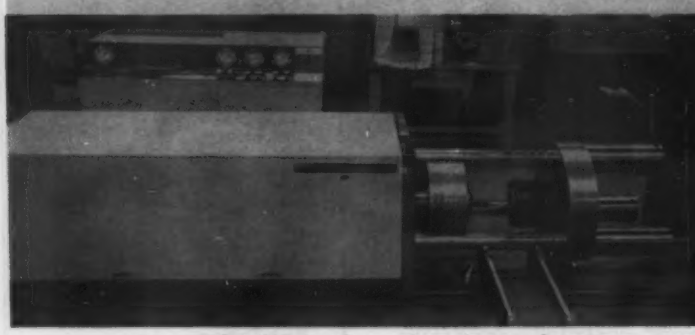
EVIDENCE

▶▶ *Here is clear evidence that high velocity extrusion of metal has dispersed stringy non-metallic inclusions. The part pictured is a hinge pin for* USAF's *B-58 Hustler. The pin on the left was machined from* AISI *4335 modified bar stock. The clearly visible inclusions made the part unfit for service. The pin at the right is made from the same material, but only after it had been extruded at very high velocities by a* DYNAPAK *machine. The inclusions have been eliminated. The part is completely satisfactory. There is no need to change to a more costly metal, or to resort to special mill heats.*



Pneumatically energized DYNAPAK, a product of General Dynamics Corporation, is industry's first practical tool for high-energy-rate metalworking. Many industries are now adapting DYNAPAK to the solution of forging, forming, and extrusion problems. The experience of Convair Fort Worth with these hinge pins gives evidence of another of DYNAPAK's advantages. The hydrodynamic behavior of metal when it is worked at DYNAPAK velocities results in homogeneity and refinement of structure and in dispersal of inclusions.

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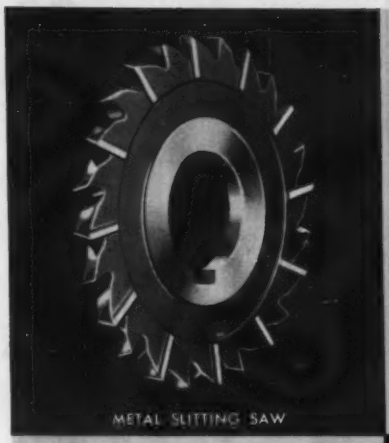
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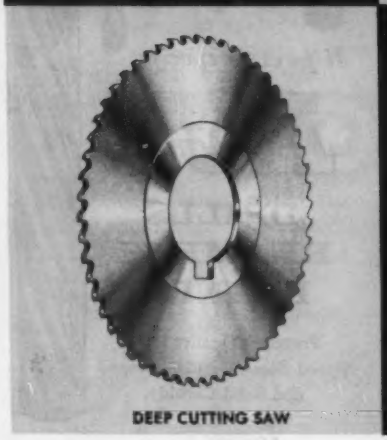
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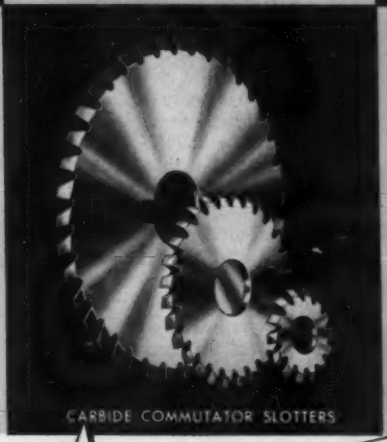
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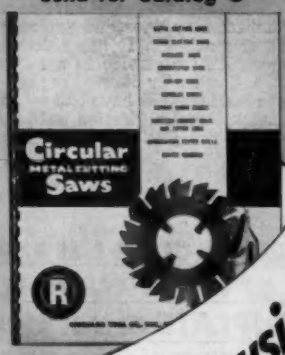

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temperature exceeds a predetermined value regardless of the motor's rate of temperature rise.

The exhibit will include a new line of industrial pressure switches (illustrated) for pilot-duty applications on pneumatic and hydraulic systems of process machinery, machine tools, welding equipment, and for use on pressure lubricating systems. The switch, designated the CR127, has one normally open and one normally closed pilot-duty contact rated at 15 amperes on 110 volts and 5 amperes on 660 volts alternating current. It supplements the company's CR2927 M diaphragm-actuated pressure switch now used for pilot-duty applications and starting motors up to 5 hp.

Both bellows type for ranges up to 300 psi and piston type for up to 3000 psi are available. The bellows type is offered in six pressure ranges and operates from air, oil, or water pressure; while the piston type is for use on hydraulic applications. Designed primarily for machine tool applications, the CR127 B bellows type is furnished with a 0.060-inch orifice to prevent false operation due to minor pressure surges. An optional surge reducer is also available to safeguard against larger surges of pressure. The pressure setting is shown in the cover window and can be externally adjusted with a screwdriver. Optional features are a range adjustment knob and a range adjustment sealing cap.

The CR127 A piston type pressure switch consists of a steel piston in a machined cylinder. It is used only on industrial hydraulics with pressure from 135 to 3000 psi. It has a 0.040-inch orifice to protect against minor pressure surges and is equipped with a range locking nut. A surge reducer is offered as optional equipment. An oil leakage outlet on the low-pressure side of the piston is located in the cylinder wall. This provides an exit for any oil that leaks past the piston. The outlet is tapped to allow for a return line to the hydraulic reservoir. This should always be kept open to prevent back pressure on the sealing diaphragm.

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Nonreleasing Tap-Holder

V-jaw tap-holder designed to permit screw machine setups to be made easily and quickly, developed by Brookfield, Inc., Stoughton, Mass. This holder also eliminates the need for bushings and reduces tool inventory. It will accommodate either extended or close-held taps, and is said to pro-

Highly polished flutes produce smoother, more accurate holes!

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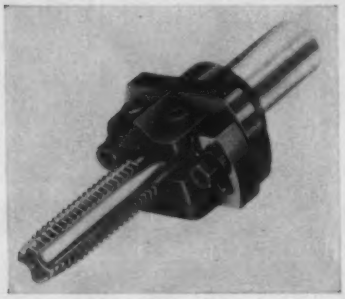
vide automatic, axially perfect tool alignment. A balanced-pressure locking assembly maintains uniform seating and firmly secures



the tap so that it cannot loosen, twist, creep, or shift. The tapholder spring return assembly is totally enclosed to exclude chips or dirt. Since side pressure is also eliminated, the spring remains free-floating even when adjusting for spindle misalignment. The adjustable V-jaw enables each tapholder unit to handle an exceptionally wide range of tap sizes. Special shanks are available.

Circle 710 on Readers' Service Card

Micrometer Depth Gage

Flat-rod micrometer depth gage designed for easier, more accurate measuring, announced by the Lufkin Rule Co., Saginaw, Mich. This No. 613 series gage allows measurements to be made at side of hole, thus excluding extra depth made by drill point. The flat rod can be turned 360 degrees to any position. Once set, the rod will not turn while measuring or "walk" away from setting. Each 0.001-inch graduation on the thimble is numbered. Other features of the gage include: broader, heavier base; durable head; non-glare chromium-clad satin finish; and hardened and ground threads.

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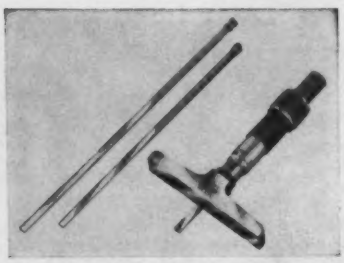
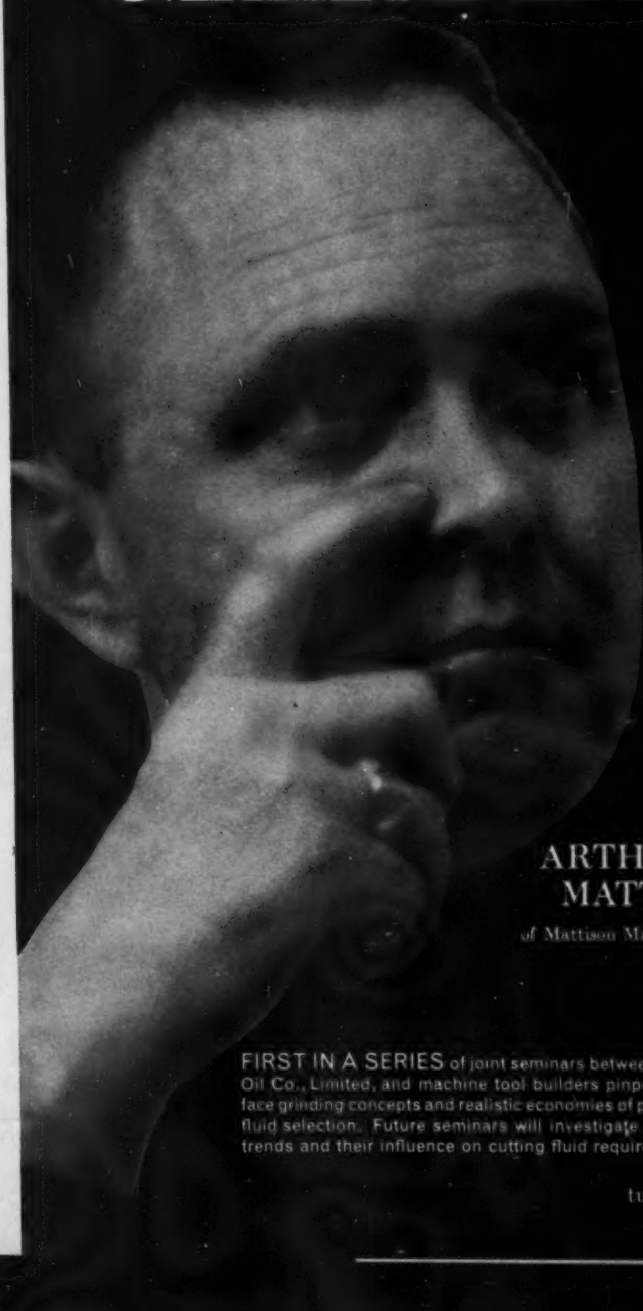


(This section continued on page 400)

HARD WHEEL THINKERS IN SURFACE GRINDING



ARTHUR M. MATTISON

of Mattison Machine Works

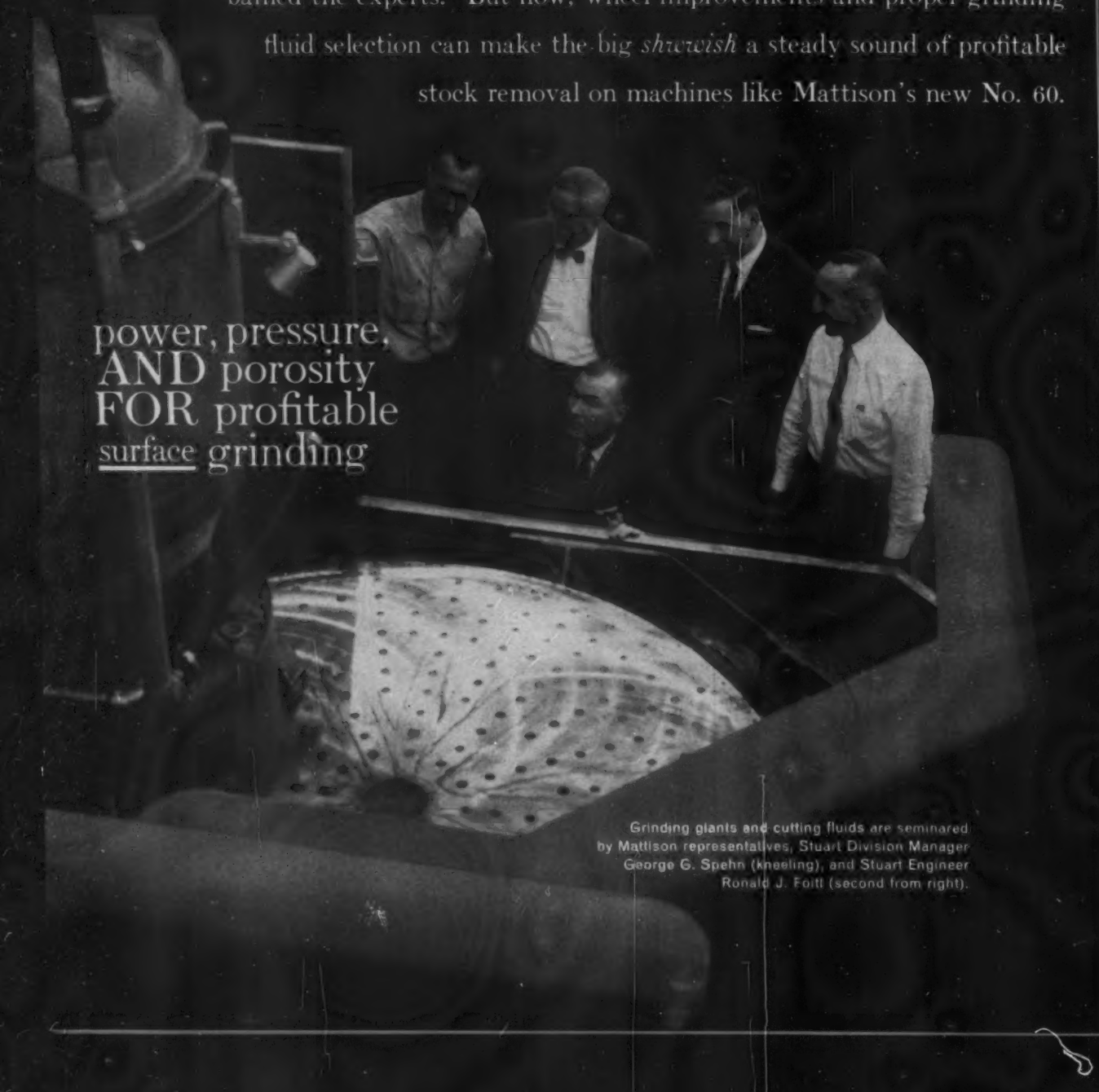
FIRST IN A SERIES of joint seminars between D. A. Stuart Oil Co., Limited, and machine tool builders pinpoints new surface grinding concepts and realistic economies of proper grinding fluid selection. Future seminars will investigate metal working trends and their influence on cutting fluid requirements.

turn the page.

MATTISON pushes the process

Down in the shop . . . have you put an ear to the "shwwish" of sharp new grits cutting stock after the dull ones broke loose . . . then cursed the rumble and groan of the grinder when only minutes later the wheel loaded up? Time was when these real sounds too often meant premature wheel wear or lack of detergency in the grinding fluid. Older wheels simply couldn't make the heavy cuts, and the "witchcraft" of choosing cutting fluids baffled the experts. But now, wheel improvements and proper grinding fluid selection can make the big *shwwish* a steady sound of profitable stock removal on machines like Mattison's new No. 60.

power, pressure, AND porosity FOR profitable surface grinding



Grinding giants and cutting fluids are seminared by Mattison representatives, Stuart Division Manager George G. Spehn (kneeling), and Stuart Engineer Ronald J. Foitl (second from right).

Russel Holm, sales engineer—bear down on wheels and ease up on costs.

Mattison Machine Works, Rockford builder of surface grinders, is pushing horsepower hard. Objective: to advance surface grinding for heavy stock removal, as well as for accurate finishing. Up to 125 hp is applied to 20" wheels. High downfeed increases grain penetration and keeps wheels self-dressing. Results show high machine efficiency and low unit cost for pieceparts properly designed for the "Mattison concept."

William C. Knapp, sales manager—pulling the belt *into* the work produces a finer finish.

Grinding wheels are really throwaways

As Arthur M. Mattison, chief engineer, points out: "Aluminum oxide wheels are a neat package of hard, self-sharpening tool bits in throwaway form. Their ability to stay sharp, even under extremely heavy cuts, eliminates a major cause of machine downtime. And, hard materials present no tool breakage problem."

Today's hard wheels are right for the "Mattison concept." Vitrified bonds are so improved that now you get economical breakdown rates under extremely heavy loads. Not only that, grits are available in individually formed crystals (instead of pulverized particles). They fracture several times as they get dull instead of pulling out whole. Thus, wheels offer a greater number of sharp cutting edges which use new spindle power to penetrate deeply into most materials, without burning.

Chip clearance still a problem

Yet to be solved is the chip clearance problem. There isn't enough space between grits. With heavy stock removal, chips tend to fill the voids in the wheel. Ratio of stock removal to wheel cost drops drastically as a result.

How grinding fluids help

Here's where cutting fluids enter decisively into the economics of grinding. Proper balance of lubricity and detergency improves efficiency, wheel life, and surface finish. The right amount of lubricity, such as in Stuart's Hi-D 106, produces full benefits from new abrasive grains which fracture and produce new cutting edges. Total lack of lubricity results in dulling and pulling out of the cutting edges before full value is received.

Heavy stock removal demands a grinding fluid with high detergency and surface wetting ability. Limited chip clearance demands active flushing so chips do not clog voids and cause loading.

Proper application is important

The importance of directing a heavy volume of fluid to the point of contact bears continued attention.

Arthur M. Mattison, chief engineer (left)—we lose flatness if the grinding fluid dries on the chuck.

A case in point, cited by Mattison engineer, Russel Holm, is a difficult disc-grinding job—removing 5 cubic inches per minute from 1045 carbon steel saw guides. After holes were provided in the wheel to improve the flow of grinding fluid, it was possible to use a grade 4½ times harder and boost stock removal. With cylinder wheels, the answer often is to pipe fluid through the center, or up *through* the work.

more next page →

William C. Knapp—some plants prefer to use solubles because of cost, but their finishes could be better.

Variation in water prevents universal grinding fluid

With varying water conditions, it is not easy to formulate the "perfect grinding fluid." A fluid that leaves accuracy destroying deposits in the Midwest easily could produce foaming in the East. Rusting and lack of stability usually can be traced to specific water conditions. As a result, variations in formulation often are required to compensate for water. Generally, it pays to lean toward high detergency when grinding large, uninterrupted surfaces for which a free cutting wheel is most important.

Linsly Brown, sales engineer—light oil is superior for abrasive belts on aluminum—water tends to drag.

Abrasive belt grinding goes precision

Nowhere in grinding is there so much technical change as in the abrasive belt field. Mattison engineer, Linsly Brown, lives in a ground swell of new applications—and the high horsepower concept (they're using up to 150) is an important part of Mattison's thinking on every job.

Yes, power and rigidity are required to get positive grain penetration at belt speeds as high as 12,000 ft per minute, holding thickness tolerances of ±.001".

Linsly Brown (left)—steel companies are using ThredKut 99 to produce #4 finish on stainless.

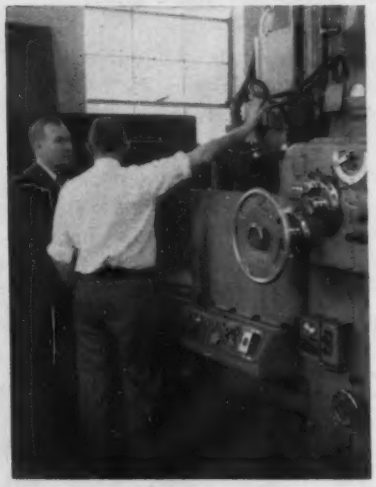
Selection of grinding and polishing oils for abrasive belts

Selection of grinding fluids gets all knotted up in belt costs, finish requirements, material specifications, and methods of application. Most of the grinding cost is in the belts, and "wet" belts cost more than the "dry" paper type. So it is more economical to use oil-type grinding fluids than water-mix types—and in most cases, they produce better finishes.

Straight oils usually work best with aluminum and stainless because bright, shiny finishes are required. For stainless sheet polishing, a sulpho-chlorinated oil, such as Stuart's ThredKut 99, has proved its superiority. For aluminum, a light viscosity oil with fatty lubricity additive, such as SuperKool 201M, produces best over-all results.

Methods available for application often make viscosity a selection factor. Generally, a heavy flow of oil is preferred. But, many jobs are performed successfully with spray lubrication or oil brushed on the work surface.

(For more information or reprints of this seminar, write to our Technical Service Department, located at the address below.)



Mattison rotary—the new 125-hp Quick-Tilt machine increases production 50%, or more. Cutting fluid must clean the wheel.

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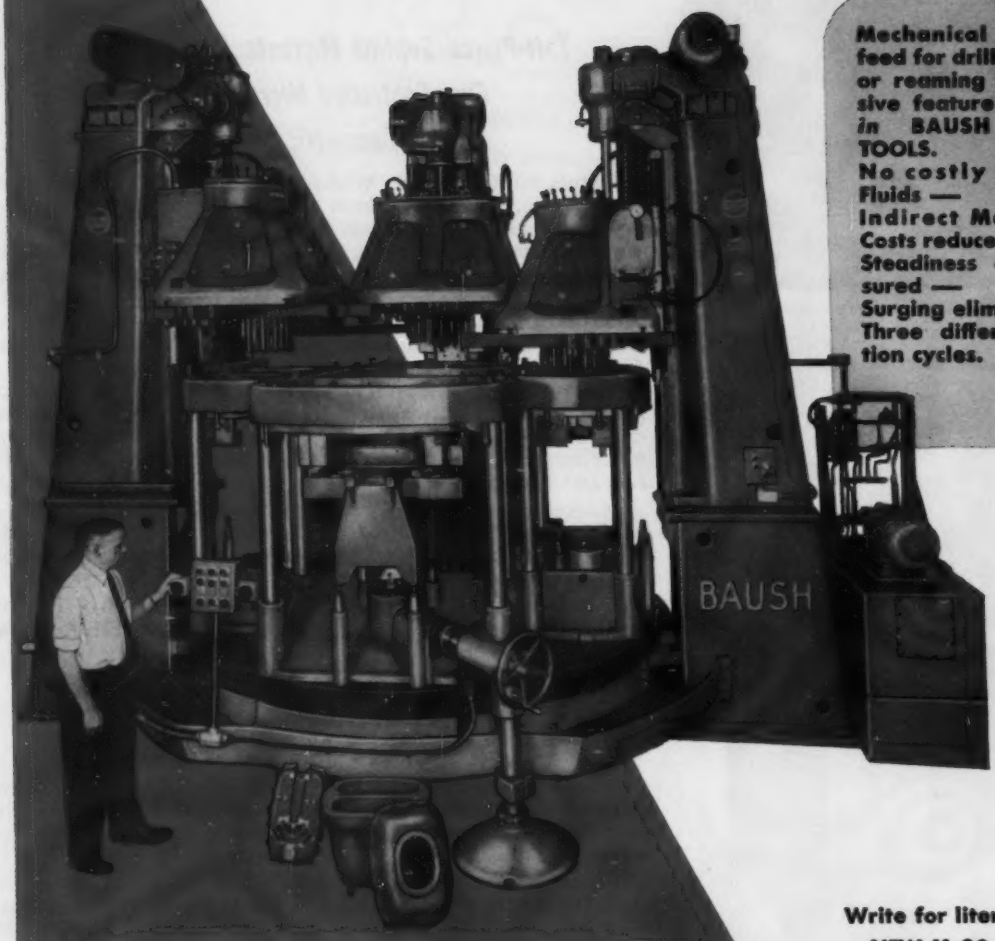

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SPECIFICATIONS:

Each of three vertical columns mounts an M-20 Mechanical Leadscrew Machine. The 124" diam. Semi-Automatic Hydraulic Rotary Indexing Table has four stations. M-20 Units are mounted at Stations 2 - 3 and 4. Each head is 27" x 40" and is bored for 32 spindles with 32 upper spindle drivers 1½" in diam. arranged for 2 speeds and a neutral position. Both feed and spindle speed are variable . . feed can be varied from .005 per Rev. Low to .090 per Rev. High, and spindle speeds from 130 RPM to 1050 RPM.

Feed is thru ball screw direct from spindle driving gears. When a head goes from rapid traverse to feed stroke an electric brake holds leadscrew and shuts off traverse motor — saving wear and tear. Heads have automatic high production cycle — semi-automatic low production cycle, and a jog cycle for set-up. Machine has 98 spindles and adjustable arms. Operation sequence is:

Station 1 — Unload and load
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Station 3 — Multiple drilling, chamfering and reaming.
Station 4 — Multiple Tapping (Master Leadscrew Method)

Machine has:

3 — 20 HP 1800 RPM motors for spindle drives
3 — 1 HP 900 RPM motors for Rapid Traverse Heads
1 — 7½ HP 1200 RPM motor operating Rotary Table.

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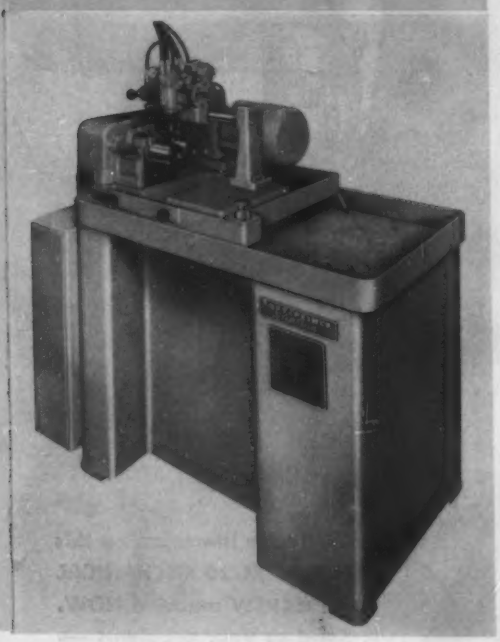
New Tools and for Surface

Above, Microstoning a Shaft with Supfina Attachment.

Below, No. 86 Centerless Plunge-Cut Microstoning Machine.



No. 88 Through-Feed Microstoning Machine, shown here with optional accessories.

Taft-Peirce/Supfina Microstoning Attachments Give Controlled Microinch Finish Plus Geometric Correction

Models 9680 & 9681 When specifications call not for just the "best finish," but for a finish controlled to a precise microinch reading, and when near-perfect roundness is a must — Taft-Peirce/Supfina Microstoning Attachments are the answer. These pneumatic marvels are easily attached to any machine tool that will move the work beneath the stones. They remove the amorphous skin left by previous operations; level the hills and valleys; eliminate chatter, feed spiral marks, and other surface imperfections induced during machining. Any metal, of any degree of hardness, and glass, plastics, and similar materials, can be Microstoned, and the Attachments are adaptable to flat, external cylindrical, or tapered surfaces. Saving steps and time over any other method, they also give vastly better results. They work fast and economically too.

Microstones, in a wide variety of shapes, grit sizes and bond hardness, are oscillated by Supfina Attachments against the moving work, generating a perfect surface without appreciable reduction in size of the work piece.

There's a place for Supfina in every shop that ever has small-lot or unusual jobs that require the ultimate in microinch finishing.

Centerless Plunge-Cut Microstoning Machine Produces Quality in Volume

Model 86 For fine finishing of small cylindrical pieces, where volume of production and superior quality are both factors, the Taft-Peirce/Supfina Plunge-Cut Microstoning Machine offers the manufacturer a shortcut to superior results.

It's fast. With its cycling action infinitely variable, it spins the work beneath the Microstones. It starts slowly for maximum material removal, speeds up for final finishing, then stops, ready for the next piece — and all in seconds!

It's simple to use. A semi-skilled operator can turn out precision pieces with ease.

It's Adaptable. Custom-made Taft-Peirce rolls for the work staging system will accommodate small cylinders of almost any shape. It's a piece of equipment that will prove profitable anywhere cylindrical surfaces up to 2" in length and from $\frac{1}{8}$" to $1\frac{1}{8}$" in diameter are produced in medium or large lots.

Automated Production Microstoning

Model 88 For completely automated production of superbly finished cylinders, Taft-Peirce offers the Supfina Through-Feed Microstoning Machine. Once set up, this machine will run for hours virtually untended, turning out work pieces rapidly with finish otherwise attainable only by long, tedious and highly-skilled handwork. Pieces that go through the Model 88 Microstoning Machine can be worked on by as many as five Microstones — from coarse for maximum material removal to very fine for high polish — using infinitely adjustable time cycles. Adjustable work rolls make it adaptable to any cylinder from $\frac{3}{16}$" to $2\frac{3}{8}$" diameter.

Auxiliary tooling for gaging and material transfer can be designed and built to meet the needs of special jobs.

Technology Finishing

Surface Grinding with Superior Accuracy

The Taft-Peirce No. 1 Precision Surface Grinder, original item in the growing line of Taft-Peirce Machine Tools, was developed to meet the requirements of the company's gagemakers. It has many features that make it outstanding among grinders. Crossfeed accuracy to .00005" and downfeed accuracy to .000012" are built in to these machine tools. The special anti-backlash crossfeed mechanism guarantees repeatability to hair-splitting tolerances every time.

Exclusive ball or roller ways for table, saddle, and column not only make parts move almost effortlessly, but also are completely replaceable, making the No. 1 Surface Grinder truly the "machine that lasts forever." Another exclusive feature is the adjustability of the table ways. With other grinders, if the table is thrown out of line rescraping or shimming is necessary. With the Taft-Peirce No. 1, simple adjustments can quickly restore perfect alignment.

Simple controls, conveniently placed, make the No. 1 a pleasure to operate — a machine on which the operator can turn out his best work for long periods without fatigue. Many attachments and accessories are readily available — such as high-speed attachments, wet grinding attachments, and more — to make this an extremely versatile machine, capable of doing almost any surface grinding job, and doing it to gagemakers' standards.

Left,
The Taft-Peirce No. 1 Precision Surface Grinder.

Below,
Taft-Peirce 24" Semi-Automatic Lapping Machine.

Production Lapping to Light-Band Accuracy

Flatness to one light-band (.000011") and surface finish to one R.M.S., can be achieved easily on the Taft-Peirce 24" Semi-Automatic Lapping Machine. Exclusive plate mounting methods allow use of reversible plates for longer wear and for quick conversion to either plain or serrated surfaces. Concavity is adjustable to compensate for normal wear or to step up efficiency on certain lapping jobs. Compound dispensing is completely automatic, and tanks with built-in agitators are readily interchangeable. A Taft-Peirce engineer can show you how you can get better results on your own individual jobs by using the Semi-Automatic Lapping Machine.

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Only *genuine* Allens have Leader Points that make starting easier, and greatly minimize danger of cross threading. *Genuine* Allens are "pressur-formd" to preserve the long fibers uncut throughout the length of the screw, giving stronger sockets for greater tightening torque.

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Allen's new 1960 Series Socket Head Cap Screws give up to 2½ times more load carrying capacity, without indentation. Head diameter of sizes from ¼" up is now uniformly 1½ times the body diameter—providing more under-the-head bearing surface, and a proportionate increase in clamping force. Write for new Bulletin G-25, with full specifications.

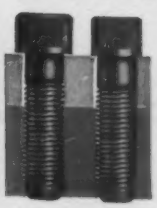

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Fig. 1. Ruthman Model 9-P3 coolant pump for shallow sumps

Ruthman Coolant and Molten Metal Pumps

Booth 376

Operating models of a number of coolant pumps will be featured by the Ruthman Machinery Co., Cincinnati, Ohio. Among the new Gusher pumps to be displayed is a Model 9-P3 coolant pump (Fig. 1). This unit is a compact, 1/10-hp, flange-mounted coolant pump with two internal and external discharges. It has a capacity of 18 gallons per minute at a 10-foot head and is particularly adapted to shallow sumps.

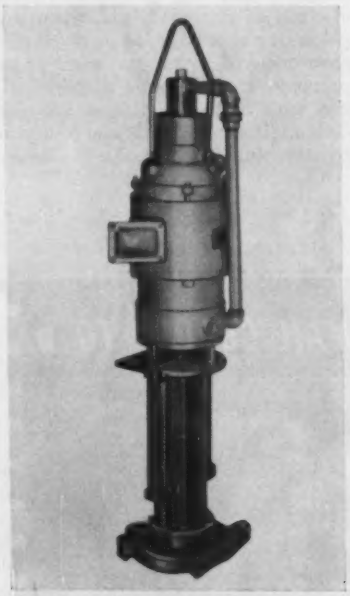

Fig. 2. Molten metal pump for liquids up to 1300 degrees F.

MMT-PE

Visit Area No. 1134

MACHINE TOOL EXPOSITION

International Amphitheatre, Chicago, Sept. 6-16

CHICAGO

DREIS & KRUMP

Mechanical and Hydraulic Press Brakes in Operation and Press Brake Tooling

Bending and Forming

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PRESS BRAKE APPLICATION AND TOOLING CLINIC

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Press Brakes • Power Bending Brakes

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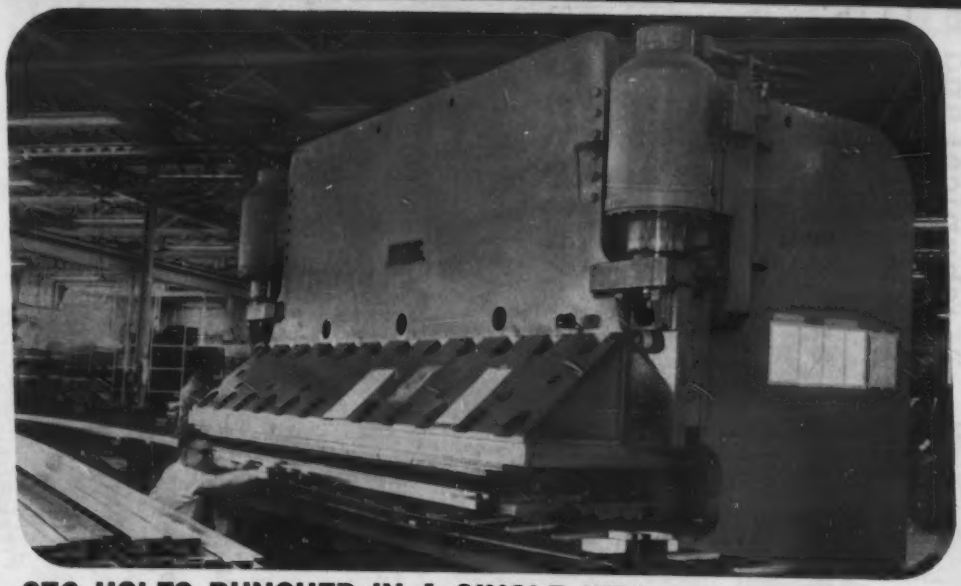
15 years engineering and millions of dollars invested* to perfect the world's finest brake... today's PACIFIC HYDRAULIC PRESS BRAKE

Over 9 out of every 10 hydraulic press brakes in operation today are PACIFIC providing...

- More dependability
- Freedom of maintenance and leakage
- Simpler electric controls
- Simpler hydraulic control
- More accuracy in level control
- More accuracy in air bending
- More operating convenience
- Greater visability
- More rigidity in cylinder construction
- Shock-free hydraulic system suitable for punching



672 HOLES PUNCHED IN A SINGLE HIT!

Unique upper ram guides and extra rigidity of platens of PACIFIC hydraulic press brake enable the punching of 672 holes in a single hit over a 45" wide by 14 ft. long side panel at Brown Trailer Division, Michigan City, Indiana. This rigidity permits 40 ft. long rub rails to be punched progressively with 70 holes on 2" centers over 12 ft. length on the front of the die as shown in the above photo. Cushioned hydraulic breakthrough softens the punching action on the dies to greatly increase individual punch life and eliminate costly downtime from periodic die replacement of 672 separate dies.

*THIS INVESTMENT ENABLED PACIFIC TO INTRODUCE:

- Tape control to synchronize cylinders within .003" (1947)
- Cushioned punching (1949)
- Precision depth control to repeat accuracy within .001" (1951)
- Manual turret stroke controls for progressive bending (1952)
- Selective anti-whip speeds to eliminate reverse bends (1952)
- Tandem operation of press brakes for forming pieces 40 ft. or longer (1953)
- Tonnage control to protect light dies in heavy press (1953)
- Multiple hydraulic cushion cylinders for deep drawing (1954)
- Overhead integral power unit for increased accuracy (1955)
- Cylinder ram guides for increased rigidity (1956)
- Shearing attachment for shearing heavy plate on press brake (1958)
- Pipeless stacking of valves to eliminate pipe breakage and leakage (1959)
- Shockless hydraulic valving to eliminate cause of leakage (1959)

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DISTRIBUTORS: ALBUQUERQUE, N. M.; DENVER, COLO.—R. E. Dubac Associates • ARIZONA; LOS ANGELES AND BURLINGAME, CALIF.; NEVADA—Tornquist Machinery Company • ATLANTA GA.—J. R. Carlson Machinery Company • CHICAGO, ILL.—L. G. Evans & Company • CLEVELAND, OHIO—Jackson Machinery • DAVENPORT and DES MOINES, IOWA; KANSAS CITY and ST. LOUIS, MO.; OKLAHOMA—Moehlenpah Engr. Inc. • DETROIT, MICH.—Taylor Thompson Machinery Company • DALLAS, TEXAS—Machine Tool Associates • HAMILTON, OHIO—Anschuetz Machinery HOUSTON, TEXAS—Butcher-Carter-Preston • INDIANAPOLIS, IND.; LOUISVILLE, KY.—H. B. Green Mch. Co. • MOUNT VERNON, N. Y.—Van Dyke-Churchill Co. • MILWAUKEE, WIS.; MINNEAPOLIS, MINN.—Gute Company • NORFOLK, VA.; KNOXSVILLE, TENN.—Tidewater Supply Co. • NEW ORLEANS, LA.—Dixie Mill Supply Co. • PITTSBURGH, PA.—Howard Canning PORTLAND, ORE.—Portland Machinery Company • ROCHESTER, N. Y.—Ogden R. Adams Co., Inc. • SALT LAKE CITY, UTAH—Todd Machinery Company • SEATTLE, WASH.—Portland Machinery Co. WASHINGTON, D. C.; WYNNEWOOD, PA.; MARYLAND; DELAWARE—Edward A. Lynch Machinery Co. • WETHERSFIELD, CONN.—Beisel Machinery Company • ORLANDO, FLA.—J. R. Carlson Machinery Company • TORONTO, ONT., CANADA—Hercules Presses Ltd. • WINNIPEG, MAN., CANADA—Taylor Machinery Co.

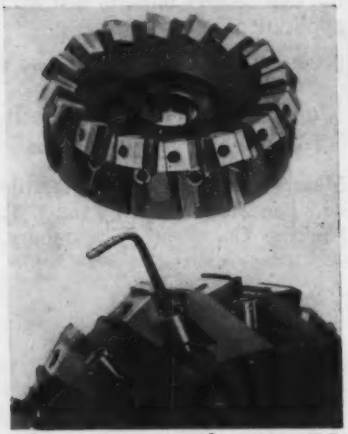
Also to be shown is a Gusher Model 150 XE molten metal pump (Fig. 2) equipped with a fully cooled shaft and bearings to permit the handling of liquids up to 1300 degrees F. Motor capacities are 1 to 3 hp. A selection of other Ruthman Gusher (sealless type) and Rumaco (seal type) pumps will be demonstrated.

Circle 712 on Readers' Service Card

Throw-Away Insert Milling Cutters for Finishing Operations

Milling cutters of a new line using throw-away carbide inserts, developed for finishing as well as roughing operations. Available from Wesson Co., Ferndale, Mich. These cutters feature adjustable tapered pins designed to provide axial support for individual inserts. Because each insert can be adjusted axially to ten-thousandths of an inch, inserts with commercial tolerances can be used for milling cutters without face runout. Pins have tapered bottom sections that are locked in the cutter body by differential screws. The top section of each pin is a straight-sided constant-rise cam with a maximum eccentricity of 0.030 inch. To advance or retract an insert, it is only necessary to release its wedge-lock screw and the differential screw in the pin. The pin is rotated slightly to support the insert in the correct position. Then, the lock-screws are tightened. Milling cutters with the new adjustable pin are available as standard in a majority of lead angles and with diameters of 5 inches and larger.

Circle 713 on Readers' Service Card



(This section continued on page 404)

Synclinal Sump Type

Capacities: 5—8—10—20—30—50—75 and 100 G.P.M.

Pipe Sizes: ¾"—1"—1¼"—1½"—2"—2½" and 3".

Connections: Coupling—Male Nipple.

By-pass Valve: Not Available.

Synclinal Line Type

Capacities: 5—8—10—20—30—50—75 and 100 G.P.M.

Pipe Sizes: ¾"—1"—1¼"—1½"—2"—2½" and 3".

By-pass Valve: Not available.

Operating Pressures: Up to 80 p.s.i.

Bonded Line Type

Capacities: 10—20—30—50 and 75 G.P.M.

Pipe Sizes: 1"—1¼"—1½"—2" and 2½".

By-pass Valve: Available with or without.

Operating Pressure: Up to 250 p.s.i.

Operating Temperatures: Up to 300° F.

MARVEL

SYNCLINAL FILTERS

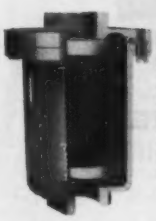
For DEPENDABLE PROTECTION on all Hydraulic and other low pressure circulating systems

Designed to give more ACTIVE filtering area—MORE dependable protection—MORE productive operation before cleaning is necessary. *Meet J.I.C. Standards.*

FILTERING MEDIA in all Marvel Filters is Monel wire cloth available in mesh sizes of 30-40-50-60-80-100-150 and 200 to meet your degree of filtration requirement.

EASY TO CLEAN—All Marvel Filters are easy to clean. Line type units operate in any position and may be serviced without disturbing pipe connections.

OVER 900 O. E. M's. install Marvel Filters as Standard Equipment.



In-Line Filter

Capacities: Up to 60 G.P.M.

Pipe Sizes: ¾"—1"—1¼" and 1½" (at both inlet and outlet).

By-pass Valve: Available with or without.

Tandem Sump Type

Capacities: 10—16—20—40—60—100—150 and 200 G.P.M.

Pipe Sizes: ¾"—1"—1¼"—1½"—2"—2½" and 3".

Connections: Coupling—Male Nipple.

By-pass Valve: Not available.

Bonded Sump Type

Capacities: 10—20—30—50 and 75 G.P.M.

Pipe Sizes: 1"—1¼"—1½"—2" and 2½".

Connections: Coupling—"O" Ring—Male Nipple.

By-pass Valve: Available with or without.

IMMEDIATE DELIVERY

A phone call can get your shipment on its way TODAY!

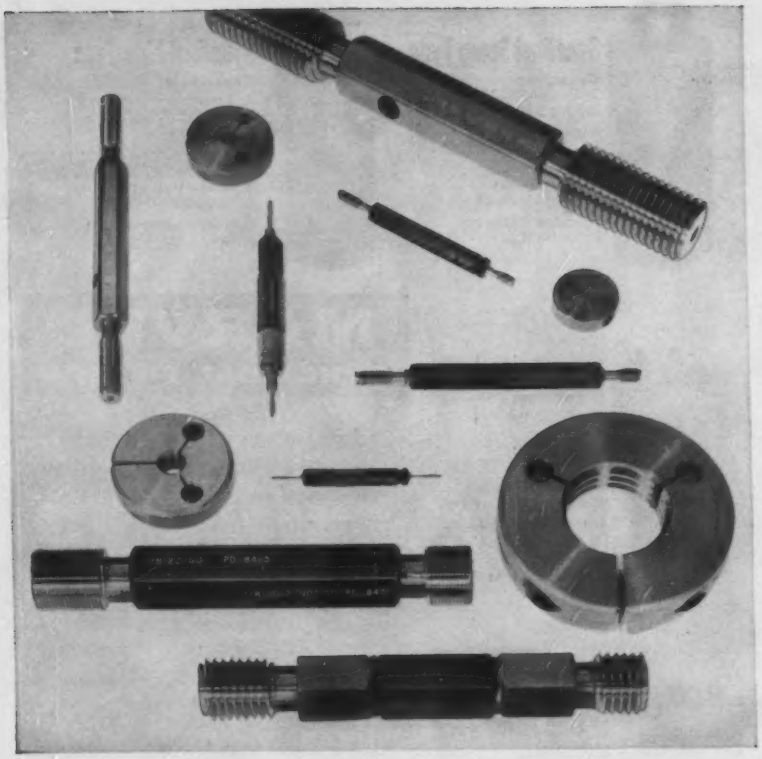
For further information on a specific type filter—Write—wire or phone

MARVEL ENGINEERING COMPANY
7227 N. Hamlin Ave., Chicago 45, Ill.
Phone: JUniper 8-6023

Please send me information on Marvel Filters as indicated: MY-9

☐ Hydraulic Oils ☐ Coolants ☐ Lubricants ☐ Fire Resistant Fluids
☐ Water ☐ Sump Type ☐ Line Type ☐ In-Line

Name_____
Company_____
Address_____
City_____ State_____



for more than 40 years VAN KEUREN has been known as the source of 'Quality in Millionths'

VK presents a
COMPLETE LINE of
THREAD GAGES

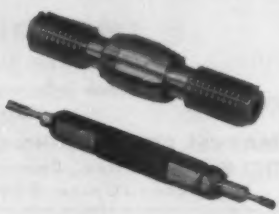
including Thread Plugs, Thread Rings and Truncated Setting Plugs.

Conforming to H28 Screw Thread Standards, these gages are made under the most modern manufacturing and inspection facilities... eliminating all questions about size, lead, drunkenness, and angle.

Exceptional surface finish and geometry; — pitch diameters checked with VK Calibrated Thread Measuring Wires . . . all combine to give unparalleled quality. *Long gage life is assured.*

Send for new catalog 36B

VK originated the reversible plain plug gage. **Here's another first, a new** design in Reversible Thread Gages with these superior features:
- Lapped center holes, both ends
- Fit standard AGD handles
- No bushing necessary
- Center holes permit accurate lead check
- Priced the same as ordinary Reversible Thread Gages.



THE **VAN KEUREN** CO.
178 Waltham Street, Watertown 72, Mass.
PRECISION MEASURING TOOLS
. . . rated the world's most accurate

Plug Gages • Measuring Wires • Optical Flats and Light Wave Equipment • Gage Blocks
Precision Lapping Service and Parts

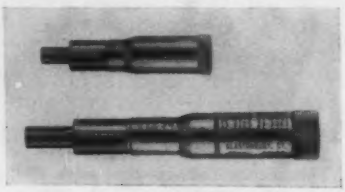
Direct-Reading Hardness Testing Machine

Air-O-Brinell metal hardness testing machine incorporating a direct-reading Brinell hardness gage, announced by the Tinius Olsen Testing Machine Co., Willow Grove, Pa. By combining accurate, foolproof load application with simultaneous read-out of Brinell hardness level, this machine is said to provide unmatched speed and accuracy for production-line Brinell hardness testing. Positive load application is assured, since the pressure gage at the top of the unit, graduated in kilograms of Brinell load, shows the exact pressure that will be applied before the test is made. To use the Air-O-Brinell, the operator simply adjusts the air-pressure regulator valve until the desired Brinell load is indicated on the gage. Once the load is set, any number of hardness tests can be made in rapid sequence. The special design of the unit assures uniform test load application.

Circle 714 on Readers' Service Card

Slocomb Micrometer Heads for Special Applications

Micrometer heads of versatile new line brought out by the J. T. Slocomb Co., South Glastonbury,



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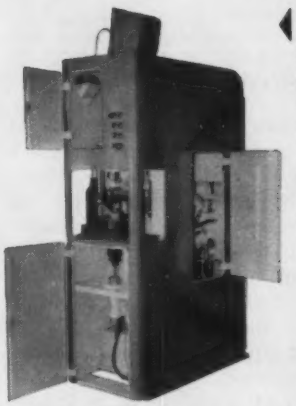
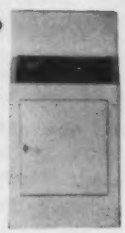
DENISON HydrOILics

Look at the new and exclusive features DENISON brings you in these two...

NEW PRESSES



MULTI-COMPACTION PRESS *shown with access doors open. Tooling setup shown is for production of tantalum capacitor anodes. Reel of tantalum wire (seen in upper compartment) is straightened, cut to exact length and fed vertically into the press. Powdered tantalum is automatically fed from overhead hopper into compaction die cavity.*



SERVO-DRIVEN MULTIPRESS "600" *with movable console which contains operating controls. Note rugged platen and large daylight area. Control lever on upper panel adjusts ram stroke for ¼", ½", ¾", 1", 1½", 2" and 3" work strokes. Feed mechanism is automatically adjusted when operating speed is varied.*

TWO NEW PRESSES fill the long-standing need for a high speed hydraulic progressive stamping press and a productive, dependable powdered materials compaction press. Here are some of the key features of these advanced new units:

High Speed Servo-driven Multipress "600"

- 600 strokes per minute with 25-ton capacity.
- Strokes per minute and ram pressures are adjustable while press is operating.
- Simple lever adjustment of ram stroke length. Cams can be easily changed for special work strokes.
- Harmonic cam drive automatically sequences the feed mechanism for perfect cycling with ram operation.
- Punch breakthrough is adjustable... does not rely on mechanical stops.
- Press frame and power unit are shock-mounted... resulting in minimum operating noise level.

Multi-Compaction Press

- Designed for volume production of ferrous, non-ferrous and exotic metals... glass and plastics.
- Fully automatic, unattended operation.
- Enclosed tooling area eliminates spillage and loss of material.
- Single or automatic cycle operation... all-hydraulic control.
- Self-contained, overhead stainless steel hopper feed.

Your nearby Denison hydraulic press specialist can show you how the new Multipress "600" and the Multi-Compaction press can help make your products better for less. Call, write or wire for details.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1152 Dublin Road • Columbus 16, Ohio

These two new presses will be demonstrated at the Machine Tool Exposition in Chicago, September 6-16.

MMT-PE
1960 Machine Tool Exposition
Denison Booth 914

DENISON
HYDRAULIC MULTIPRESS

For more data circle this page number on card at back of book

THE CARE AND FEEDING

of parts discharged at high or low heights

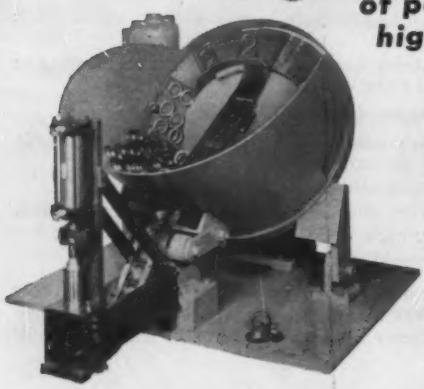
DPS ELEVATING FEEDERS elevate, orient and feed parts of almost any size, shape and material to other machinery for processing and assembly. High capacity storage bins are designed to assure a steady flow of parts to elevating mechanism regardless of load level.

Orientation of parts is accomplished at discharge point of elevator — simplifying external track construction. Feeder can be arranged for right- or left-hand discharge. Return chutes are cushioned.

New Bulletin 2812 has full data on DPS elevating feeders. Write for your copy today.

of fragile or finished parts

DPS VIBRATORY FEEDERS are bowl type units that gently handle parts too light or fragile to be handled in rotary type feeders. Through a simple electromagnetic drive, a vibrating action is transmitted to the bowl causing the parts to move up a circular, inclined track. The oriented parts then enter feed tube or discharge track to machining or assembly areas.



of parts for high-production assembly

DPS ROTARY FEEDERS employ radially slotted or grooved rotating collector rings. Efficient orienting and feeding of parts is achieved through proper design and engineering of baffle plate, selector guard, feed track, and escapement mechanism. Three different designs are available to meet holding, orienting and feeding requirements. Safety clutch prevents damage to motor or gears in the event of parts jamming.

Detroit Power Screwdriver Company offers industry's most complete line of selective feeders . . . ranging in holding area from 80 cu. in. to 20 cu. ft. For complete details, call your DPS representative or write direct. *Ask for free catalogs!*

DETROIT POWER SCREWDRIVER COMPANY
2799 W. Fort St. • Detroit 16, Michigan
A Subsidiary of Link-Belt Company

Conn. They are available in sizes 0 to 1/2 inch and 0 to 1 inch with or without friction stop and vernier. The heads may be fastened with soft solder or with a split clamp on special machinery, tools, or fixtures. The 0 to 1/2-inch head has a mounting section 15/32 inch long and 3/8 inch in diameter. The 0 to 1-inch head has a mounting section 3/4 inch long and 7/16 inch in diameter. All Slocomb micrometers have an adjusting-nut assembly feature that provides full engagement with the spindle thread. This serves to make the delicate instrument shockproof.

Circle 715 on Readers' Service Card

Buckeye Impact Wrench

Improved 34J reversible impact wrench made by Buckeye Tools Corporation, Dayton, Ohio, and said to have higher power-to-weight ratio than any previously available tool of its kind. This standard 3/8-inch air-powered production tool weighs only 4 1/4 pounds but is claimed to have an output equal to air wrenches in the heavy-duty 3/8-inch class weighing 6 pounds or more. It permits rapid tightening of threaded fasteners to high torques with maximum comfort. There is said to be little or no torque reaction on the operator. Design features include Buckeye's three-lug impacting mechanism which provides three impacts per revolution and evenly distributes the impacting force over three wear surfaces, thus providing longer life. The tool also has an exclusive step throttle that gives greater control for thread engagement. To minimize motor noise there is a built-in muffler and an adjustable exhaust deflector. The tool measures 8 inches long and has a 1/2-inch square drive and a free run-down speed of 2500 rpm.

Circle 716 on Readers' Service Card

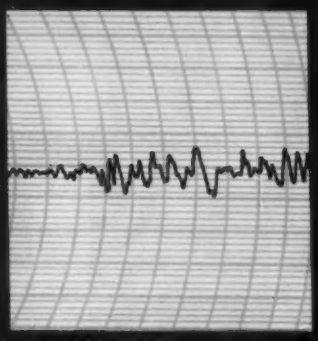
(This section continued on page 410)

THESE SURFACE TRACES

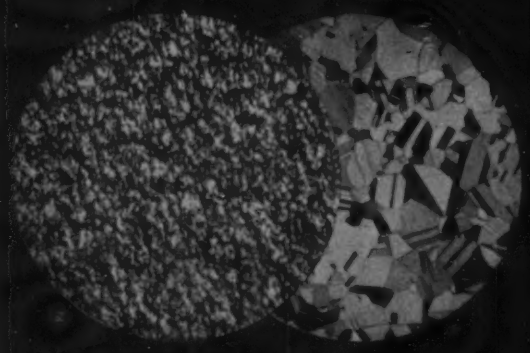
prove that you can cut polishing costs with Formbrite, Anaconda's superfine-grain drawing brass.

STANDARD DRAWING BRASS

(grain size, .045 mm) – after 40% elongation



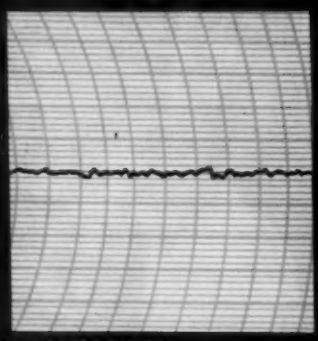
ENLARGED SURFACE TRACE showing the roughness that causes "orange-peel" effect in the working of standard drawing brass. Smoothing such mountains down to the valleys takes considerable cutting. For small deep-drawn products, up to five polishing wheels might be needed. Polishing compound costs run high; production rates, low. Bottlenecks hamstring operations.



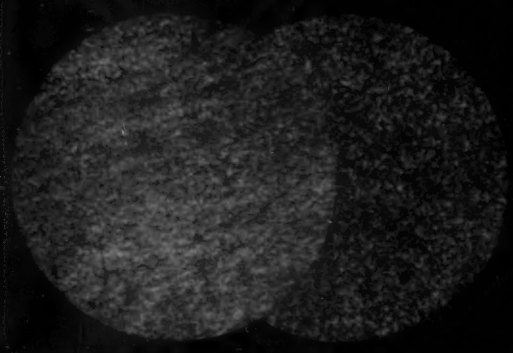
THE STRETCHED SAMPLE of standard drawing brass looks like this (left, above) when seen in oblique illumination and magnified 20x. Its microstructure is shown 75x at right. This is the kind of drawing brass that's been used for decades for stamped or drawn brass products and the micrographs show in another way why polishing costs have been high.

FORMBRITE DRAWING BRASS

(grain size, .005 mm) – after 40% elongation



ENLARGED SURFACE TRACE showing Formbrite's smoothness even after deformation, the test of polishing characteristics of a drawing brass. It is relatively easy to level these little hills on the surface of Formbrite. In many cases, users find they eliminate cutting operations altogether, need only a simple color buff. Finishing savings run up to 50%.



WHEN SEEN IN OBLIQUE ILLUMINATION and magnified 20x by the microscope, the stretched Formbrite surface looks like this (at left, above). Its microstructure is shown 75x at the right. This uniform superfine-grain structure is produced by special procedures of rolling and annealing developed by The American Brass Company.

FORMBRITE is springier, harder, more scratch resistant than the usual drawing brasses in the same standard tempers. Yet it retains remarkable ductility for forming and drawing—even such deep-drawn products as pen barrels. And Formbrite costs no more than ordinary drawing brass, despite its superiority. Get full details from your Anaconda representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

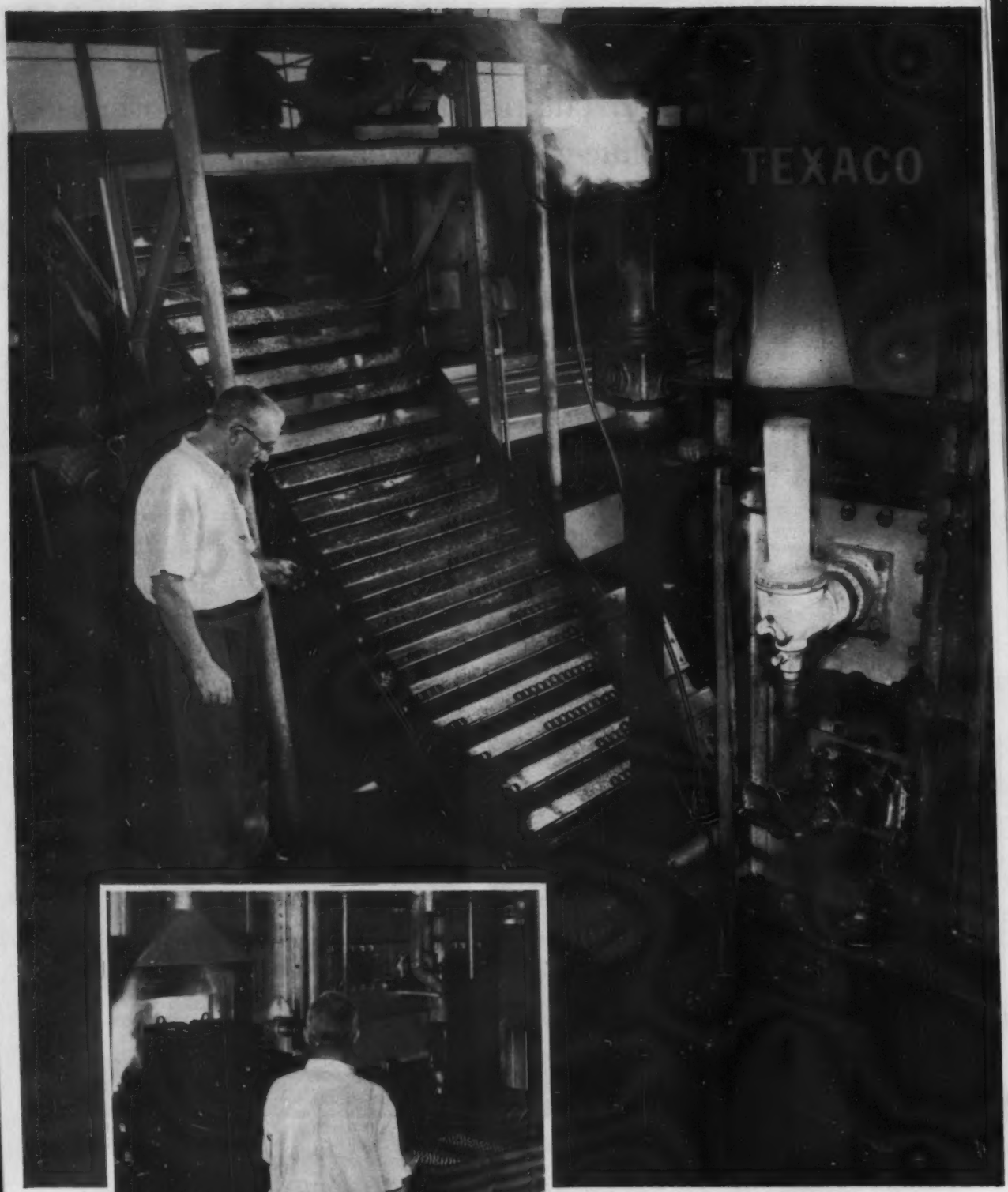
FORMBRITE®

Superfine-Grain Drawing Brass an

ANACONDA®

product made by The American Brass Company

For more data circle this page number on card at back of book



Photos taken at Hoover Ball and Bearing Company, Ann Arbor, Mich., show (left) parts going into heat treat furnace and (above) coming out of Quenchtex bath.

QUENCHTEX OILS GIVE UNIFORM HARDENING IN THE PIECE

with improved grain structure... no darkening of metal...longer bath life...

The proper choice of a quenching oil depends on the analysis of the steel being used and the hardness desired, among other factors.

A properly chosen quench for any given steel should remove heat fast in the high temperature range, and at a lower rate as the temperature drops through the low ranges where the metal becomes brittle and subject to stress. Because steels vary widely in analysis, Texaco offers three separate QUENCHTEX OILS—each with a different cooling curve.

The differences in cooling rate between the three QUENCHTEX OILS are functions of their composition:

- **QUENCHTEX 500**—a conventional or straight mineral oil of low viscosity;
- **QUENCHTEX 510**—a medium-speed oil blended with special additives;
- **QUENCHTEX 520**—a high-speed oil blended from refined paraffin base crudes plus additives.

GET THESE PROVED ADVANTAGES WITH QUENCHTEX OILS

- Stability at recommended temperatures
- High resistance to evaporation loss and chemical change which occur on contact with hot metals
- Resistance to oxidation which causes contamination, oil and metal discoloration, uneven hardening
- Low drag-out and evaporation loss for longer oil life and greater economy
- **Compatibility with other quenching oils. You can begin using Quenchtex now—regardless of the oil now in your tanks.**

A Texaco Metalworking Specialist will be glad to take a sample of the oil you are now using for testing by Texaco's Research Laboratory. A cooling curve will be run on the sample and the compatible QUENCHTEX OIL will be recommended for make-up. For further information contact the nearest of the more than 2,300 Texaco Distributing Plants or write: Dept. MA-50.

☆ ☆ ☆

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

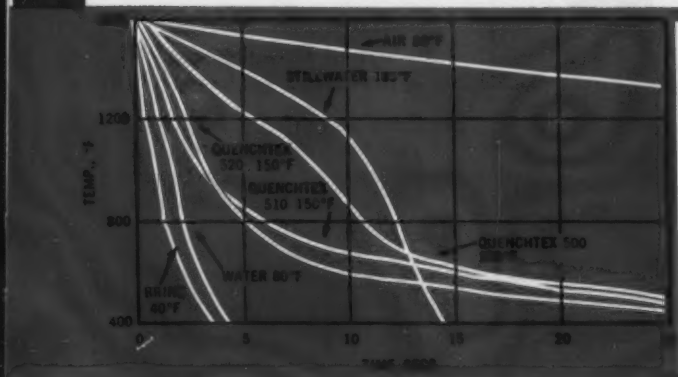


Chart shows cooling rates of several quenching media including QUENCHTEX 500, 510 and 520.

TEXACO MARQUENCH FOR HOT OIL QUENCHING

For products where full hardness combined with minimum distortion is required—gears, ball and roller bearings, bearing races, etc.—hot oil quenching with MARQUENCH can help reduce the number of rejects, increase product load capacities, and in some cases permit closer tolerances before quenching.

TEXACO

Throughout the United States
Canada • Latin America • West Africa

For more data circle this page number on card at back of book

ELDORADO*
GUN DRILL

DRILL HOLES

more economically...more efficiently, with controlled surface finish.

Drill straight, round, accurately finished holes at high speeds...through solids, blow-holes, hard spots and across-holes, in one single operation.

If you are now using gun drills, it will pay to find out how ELDORADO can cut your costs, give you improved hole finish. Chances are there's an ELDORADO Gun Drill in stock for you. Avail yourself of ELDORADO's experience and research facilities to answer your 'hole' problem.

Send for NEW LITERATURE on Gun Drills and Gun Reamers.

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MADE TO YOUR SPECIFICATIONS:		AVAILABLE FROM STOCK:	
Sizes	.1250" to 2" dia.	⅛" to ½" dia. in 64ths	½" to ¾" dia. in 32nds
OA Lengths	4" to 120" with dia. limits	10", 16", 22", 36"	16", 22", 36"
Drivers	Std. or to fit your need	.750" dia. x 2¾" long	1" dia. x 2¾" long
Tips	Carbide	Carbide	Carbide
Now, order from stock, or send in your specifications for a prompt quotation.			

Specializing 100% in Gun Drills and Related Tools.

ELDORADO TOOL & mfg. corp.

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348 Boston Post Road • Milford, Conn.

Small Abrasive Discs Packaged in Transparent Plastic Tubes

Small abrasive discs made by Behr-Manning Co., Troy, N. Y., a division of Norton Co., are now packed in clear plastic tubes. The plastic tube packaging is being used for pressure-sensitive adhesive discs employed mainly in metal grinding and finishing operations. The new butyrate holders are easy to open and give complete protection to unused discs in storage. They provide dustproof, moisture-tight packaging which retards drying of the adhesive coating. Discs in diameters from 1/2 inch to 2 1/4 inches are packaged in tubes of five sizes. The discs are used mostly on high speed power tools and stationary disc sanders.

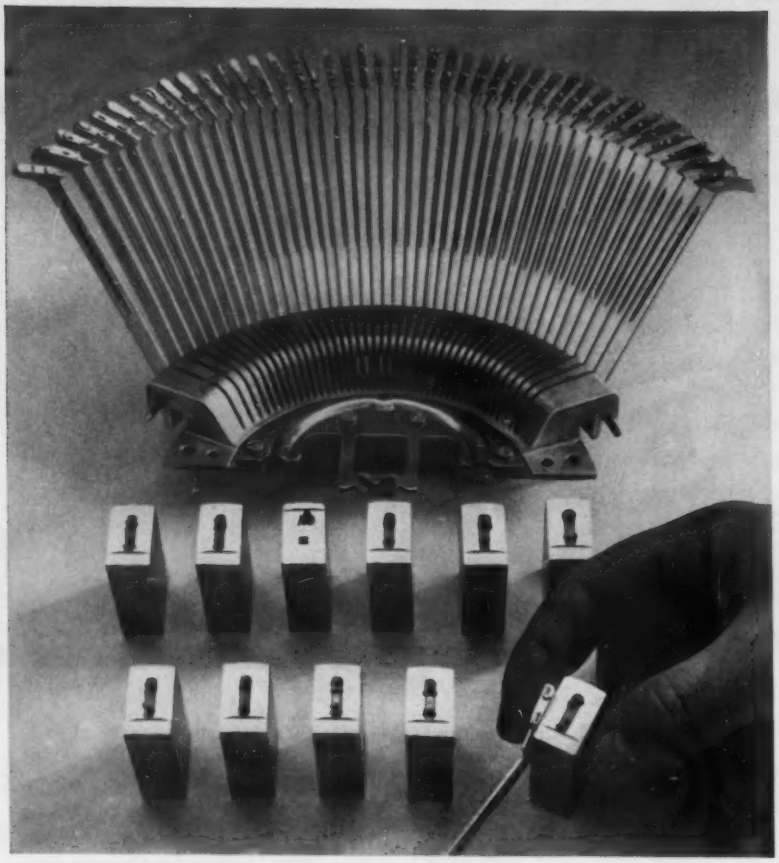
Circle 717 on Readers' Service Card

Sonalarm for Operating Relays at Preset Sound or Vibration Levels

Sonalarm unit, Model 160, which operates relay contacts (normally closed or normally open) at a preset sound or vibration level, manu-

Tool Steel Topics

BETHLEHEM STEEL



IBM makes 200 per cent more type slugs per matrix with Bearcat Tool Steel

Talk about enthusiasm! At the Lexington, Ky., plant of International Business Machines Corp. they have good reason to sing the praises of Bearcat tool steel. Recently, production of type slugs per matrix was improved 200 per cent by changing to a die made of Bearcat. The die "kneads" raised letters of the alphabet into steel slugs.

Bearcat is best known for its remarkable shock-resistance. In this instance, the manufacturer also reported better resistance to wear, and easier machinability (as compared with the tool steel formerly used).

Bearcat is our super grade of shock-resistant air-hardening tool steel. It's ready and willing to handle the toughest shock applications. Because it's an air-hardening steel, Bearcat minimizes both quenching hazards and distortion in heat-treatment.

Like to try Bearcat? Telephone your Bethlehem tool steel distributor.

BETHLEHEM TOOL STEEL ENGINEER SAYS: TOOLS can be repaired by welding if the proper procedure is used

To incorporate design changes or repair, all tools and dies made of tool steel can be welded successfully if the following procedure is observed:

1. Full-anneal the tools. Good atmosphere control is necessary to avoid scaling and decarburization of the working surfaces.

2. Prepare the crack for welding by "veeing" its full depth and length. Magnetic particle inspection is advisable.

3. Use a welding rod which will deposit steel of the same composition as the tool.

4. Preheat to 400 F - 800 F, and maintain this temperature during welding.

5. Clean the slag from each bead before proceeding with the next bead.

6. Immediately after welding, transfer the tool into a warm furnace (400 F min) and full-anneal.

7. Machine or grind the weld to the desired tool dimensions.

8. Heat-treat the tool by quenching and tempering to the desired hardness, using the standard procedure for the grade involved.

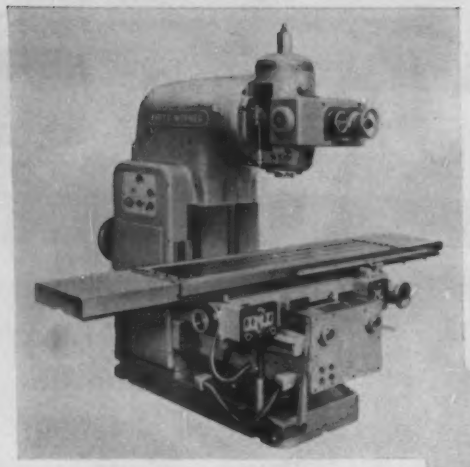
9. Grind the tool working surfaces. The depth of metal removal will depend upon the amount of decarburization produced in Steps 1, 6, and 8.

The use of this procedure will permit the successful welding of tools if it is essential that welding be done. In the majority of instances, however, it will be found both cheaper and quicker to make up new tools.

When emergency welding is done on a production line, it is often necessary to eliminate many of the steps mentioned above, thereby reducing the chances of producing successful welds.

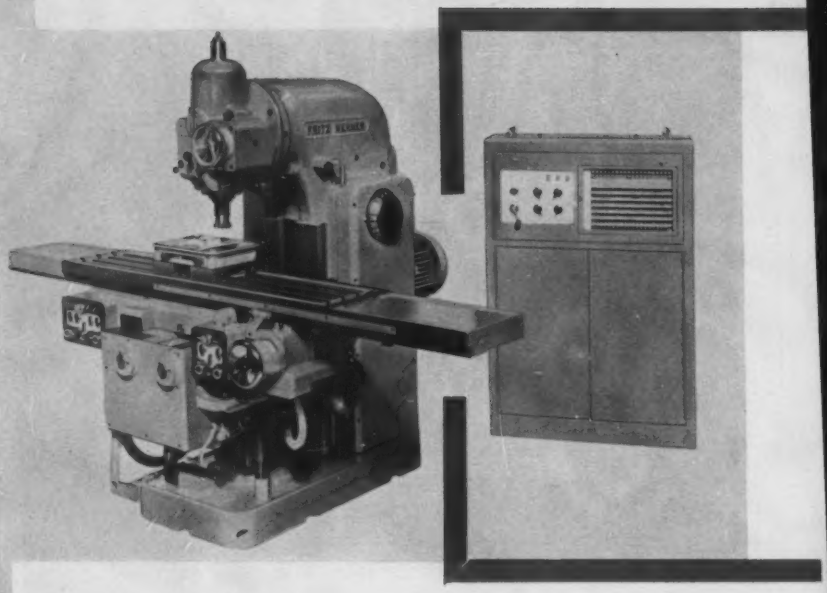
WERNER

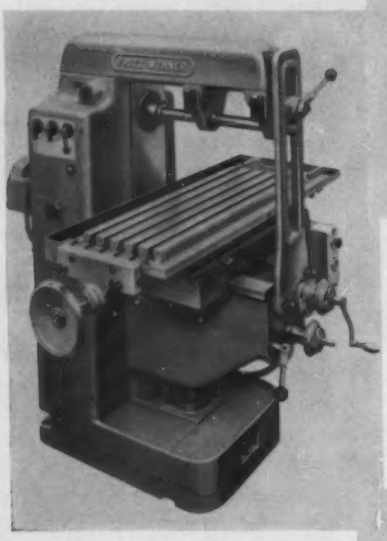
On Display and in



Above: Vertical Millers 1-6

Right: Werner Vertical Miller equipped with program control.

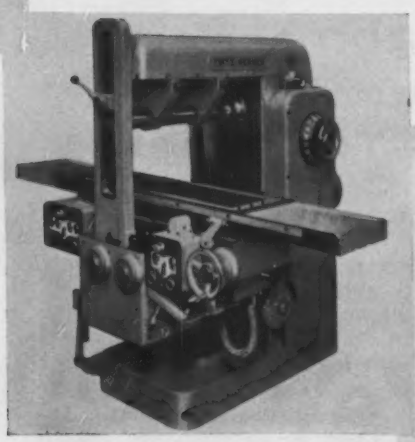




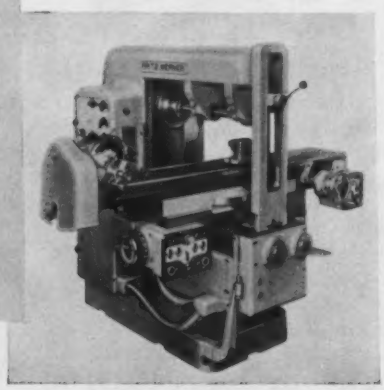
Above: Production Millers 0-4

Right: Plain Millers 1-6

WERNER vertical, universal, plain and production millers can all be equipped with program control to fill the gap between standard machines for "one-off" applications, and special-purpose machines and transfer lines for full mass production. Each is a standard machine with the addition of the special control system, and each can be used at any time as a normal machine without any modification.



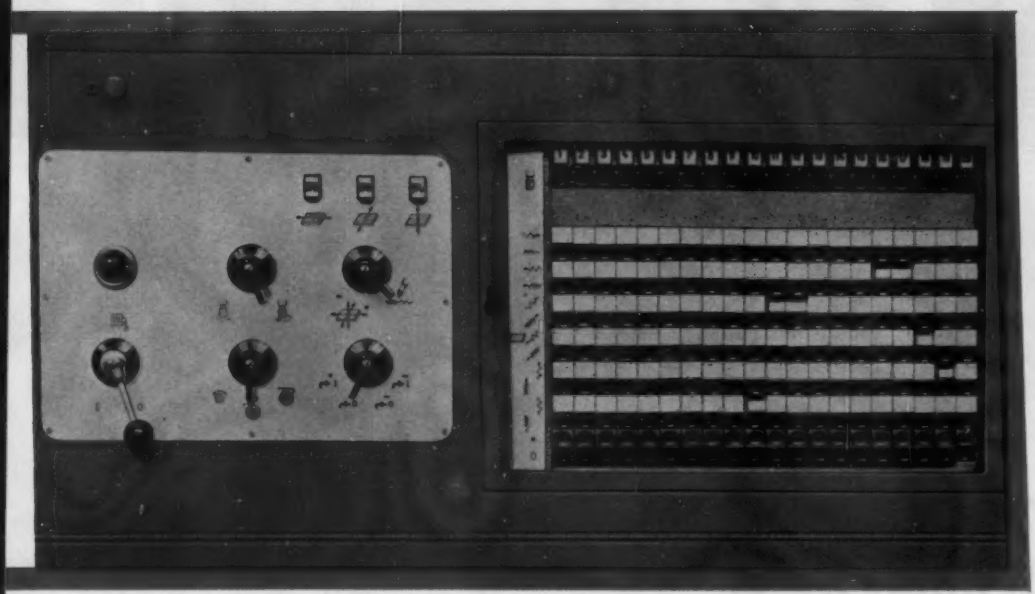
Below: Universal Millers 1-4



PROGRAM CONTROL

Action at the Chicago Coliseum – Space 417

1513 South Wabash Ave.



THE CONTROL PANEL

Left: Front of the control cabinet showing main switch and selector switches. The number of sequence steps desired determines the design of the control cabinet, which can be supplied with as many as four banks of keys, each controlling 20 sequence steps.

Fritz Werner automated, three-dimensional program milling saves 40% to 70% over conventional milling. Operations involving the machining of work-pieces in various planes and directions can be accomplished in a single loading. Changeover and retooling times are slashed, because longitudinal, transverse and vertical motions can be selected to take place in any sequence and at any frequency. The positive machine cycle insures uniform accuracy and predictable production times, as the knowledge and watchfulness of the skilled machinist are built into the control system.

One of the major advantages of WERNER program-controlled milling is its flexibility. The equipment can be purchased with the knowledge that its versatility is ample to deal with any subsequent machining sequence or work-piece modifications. Setting the program control only requires the selection of the modes and directions of motion on the push button panel of the control cabinet and the setting of the trip-dogs for the lengths of transverse in the three milling directions.

Any desired program cycle can be selected rapidly so that the machining of small batches is just as economical as larger batches or high-quality runs. Interchangeable selector button station-masking templates and trip-dog bars can be used for recurring program cycles thus reducing the setting or re-setting time to a few minutes only. In addition, because FRITZ WERNER Millers are standard machines to which the separate control system is added, they can be used as conventional machines at any time and without any modification.

On production milling, WERNER program control eliminates the need for frequent stage inspections by eliminating operator's errors. The work of the operator is confined to loading and unloading. On short-run production the speed with which job changeovers can be accomplished pays big dividends.

Investigate these advantages further! See WERNER program milling in action at the Coliseum, or send for our handsomely illustrated booklet that gives the facts about program milling, and shows how it can pay you big dividends.

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For more data circle this page number on card at back of book

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by KIRK & BLUM

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Kirk & Blum's capacity for steel and alloy fabrications to ½" thickness and up to 25 tons is vividly shown in a new 40-page Sheet and Fabrication Catalog. Request your copy or, even better, send your prints for a K&B proposal.

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factured by the Instrument Division of H. H. Scott, Inc., Maynard, Mass. The standard model operates at 70 to 100 db sound pressure level, and has a differential of 2 db. Electronic delay prevents tripping on single impacts. There is an audio output jack for earphone or power amplifier. Business applications include product testing for noise level, operating intrusion alarms, gathering statistical data, and controlling processes and machines.

Circle 718 on Readers' Service Card

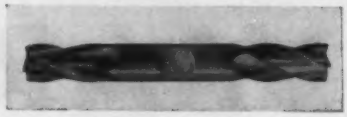
Raybestos-Manhattan V-Belt

Fully molded, fully jacketed notched V-belt announced by Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J. The primary advantages claimed for this new "CX" V-belt are quiet, vibrationless running characteristics, ruggedness, and greater flexibility, permitting it to run smoothly over smaller pulleys. In addition, the fully molded and fully jacketed construction eliminates flex- cracking and greatly increases fatigue resistance. The firm, fabric-covered body also resists cross-sectional distortion, maintains lateral stability, and resists changes in effective length. This belt is cool-running and has an exceptionally long life.

Circle 719 on Readers' Service Card

Four-Flute, Double-End Thriftmill

Ground from the solid and metallurgically tested high-speed steel,



Longer Life! Superior Dependability!

THE ALLEN-BRADLEY LINE of BULLETIN 700 RELAYS IS COMPLETE!

TYPE B general purpose relay shown with 2 N.O. and 2 N.C. contacts. Made with up to 8 poles in various arrangements.

TYPE BX universal relay shown with 4 poles having both N.O. and N.C. contacts. Additional contacts on the 6 and 8 pole relays are N.O. only.

THESE IMPROVEMENTS ARE *IMPORTANT!*

These improved Bulletin 700 Type B and Type BX relays are establishing new standards for relay life and reliability. New design increases mechanical life by *at least 5 times* . . . a new contact motion insures *at least 10 times* greater electrical reliability. Double break, silver contacts never need maintenance, and the new molded coil is impervious to the most severe atmospheric conditions.

These new A-B relays—with their *extra millions of trouble free operations at no increase in price*—are a bargain in the relay field. Write for complete details, today.

NEW ENCLOSURES

for the Bulletin 700 relays are styled by Brooks Stevens—internationally famous industrial designer. Note the "family" resemblance of these enclosures.

NEMA 1

NEMA Type 1 for general purpose applications with wrap-around cover for ready accessibility. It has a "quality" appearance.

NEMA 4

NEMA Type 4 enclosure for applications that require a watertight and weather-proof seal.

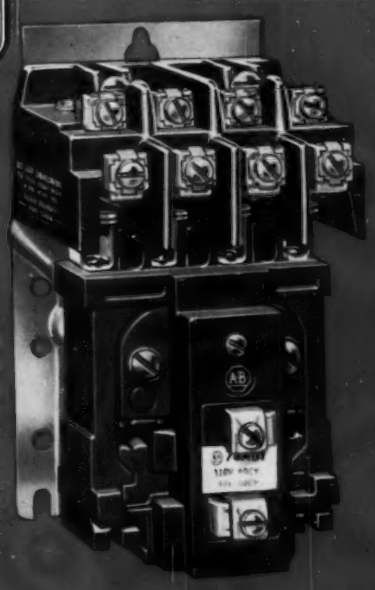
NEMA 7

NEMA Type 7 enclosure for NEC Class 1, Group D hazardous gas locations.

11-60-M

A-B QUALITY

TYPE BR Bulletin 700 convertible contact relay shown with four poles. Made with up to six poles in line.



No other relay offers such simplicity in changing contacts from N.O. to N.C. (or vice versa)—it takes only 60 seconds!

A four pole unit provides any of the contact combinations otherwise available only with five relays of the fixed contact type. You can reduce your relay inventories. In tests, this relay has *proved* it will provide many millions of trouble free operations. Double break, silver contacts never need servicing. Also, each relay can have one or two complete and full rated contacts added to its base—in the field—without increasing space requirements. If you don't know about the Type BR relay, let's get acquainted.

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley, Canada Ltd., Galt, Ontario

QUALITY MOTOR CONTROL

ALLEN-BRADLEY

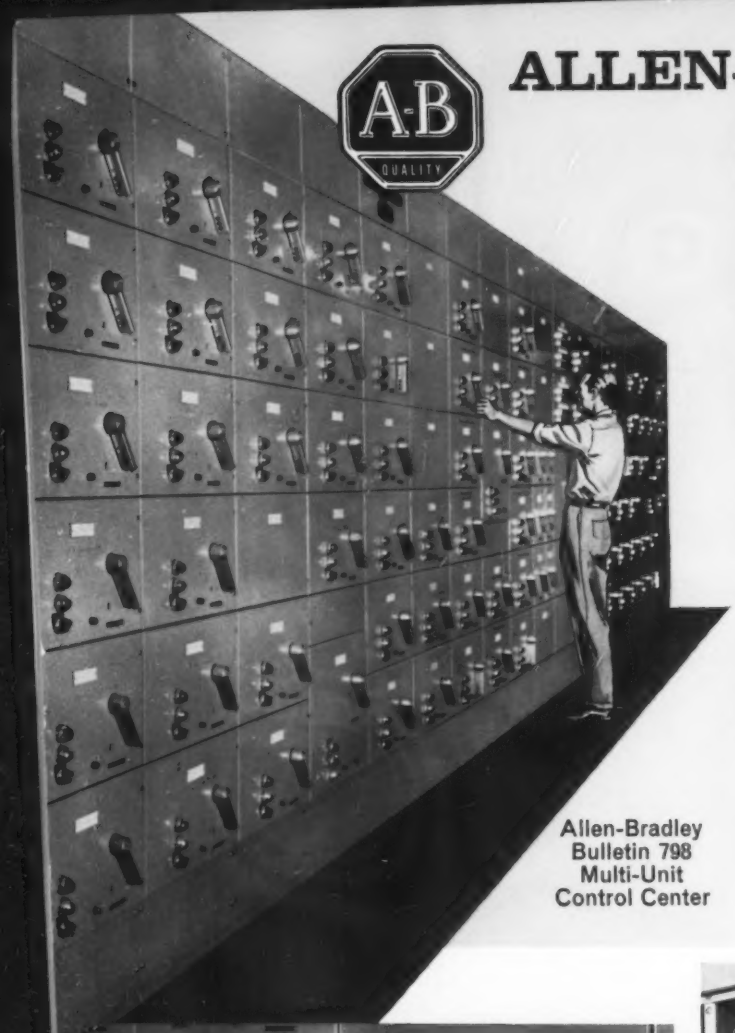
Quality Control Centers

...the mark of a modern plant providing the utmost in reliability, safety, convenience, and lasting beauty

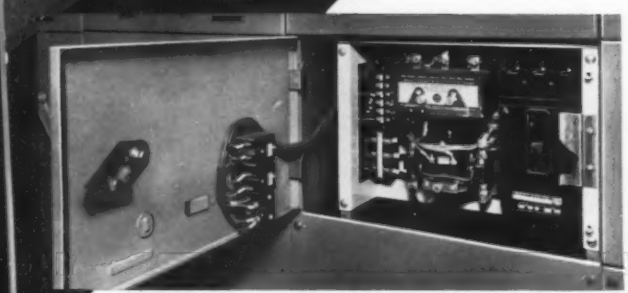
The superior *quality* of Allen-Bradley control centers provides a modern and attractive installation—one that you'll be justly proud to have in your plant. The cost is commensurate with the quality of the workmanship—but you'll never have reason to regret your decision. Furthermore, Allen-Bradley control centers arrive completely wired and tested—and *installed* costs are usually substantially lower than that of individual starters.

The flexibility of A-B control centers makes them readily adaptable to changing needs. Individual units can be added or modified without internal rewiring. In addition, entire sections can be added to meet future plant expansion.

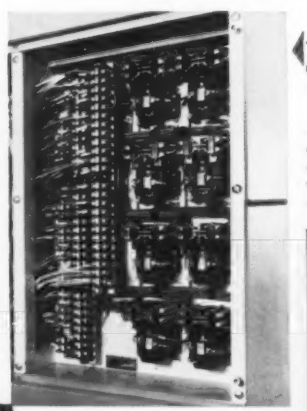
For the finest in control centers, you cannot surpass Allen-Bradley's Bulletin 798. Write today.



Allen-Bradley Bulletin 798 Multi-Unit Control Center

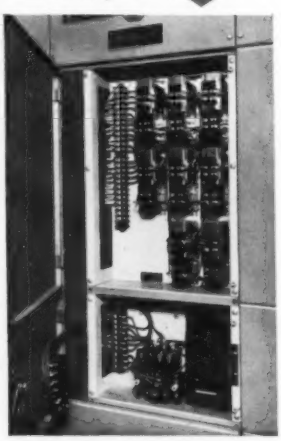


This shows A-B control center unit with popular A-B Bulletin 709 solenoid starter and circuit breaker.



This shows A-B Bulletin 700 control relays mounted in an A-B control center unit.

A-B control centers can be equipped with a wide variety of components. These Bulletin 849 timers are used on an automatic conveyor line.



This huge, 48-foot A-B control center houses 101 A-B Bulletin 709 solenoid motor starters. It is designed to permit an addition containing 50 more Bulletin 709 starters.

ALLEN-BRADLEY

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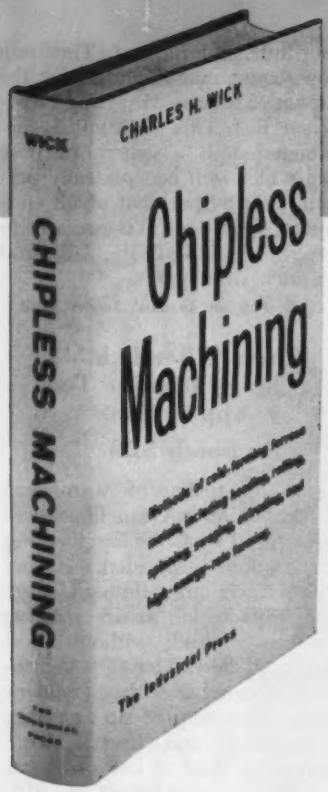
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. · In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL



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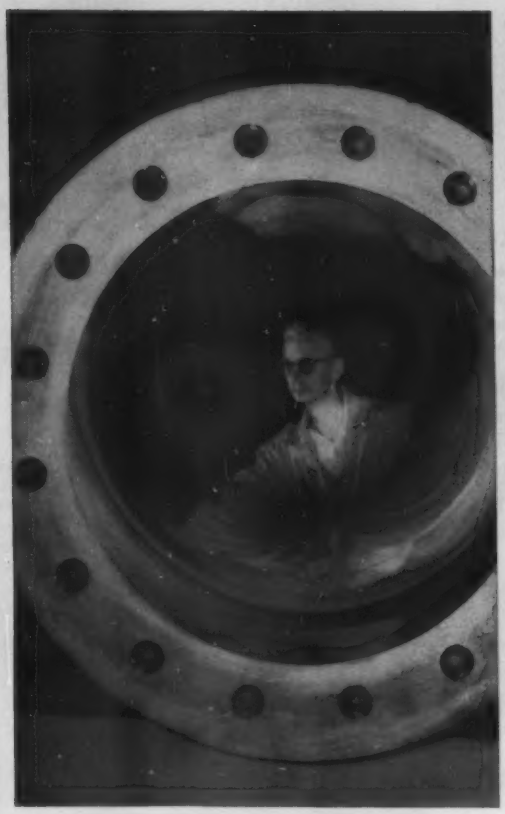

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four-flute, double-end Thriftmill now being manufactured by the Brown & Sharpe Mfg. Co., Providence, R. I. This Thriftmill is recommended as a general-purpose tool which will economically perform over 80 per cent of all end-milling operations. It is available in 1/8-, 3/16-, 1/4-, 5/16-, 3/8-, and 1/2-inch sizes.

Circle 720 on Readers' Service Card

Cuno Filter Exhibit Stresses Machine Tool Applications

Booth 529

A complete line of Auto-Klean and Super Auto-Klean filters will be featured by Cuno Engineering Corporation, Meriden, Conn. These filters are all-metal, edge type units which assure positive filtration of fluids without interruption of flow. They are continuously cleanable with manual or motor drive, require no cartridge replacement, and handle large volumes of fluid at low pressures in a filter housing about one-fifth the size required for use with disposable filter cartridges.

The exhibit will stress operating advantages of the filters in terms of their application to metalworking plant operations. Typical uses in this area include the protection of machine tools from damage to vital bearing areas by trapping solid particles in lubricant lines, and the removal of contaminants from hydraulic fluids where uninterrupted flow must be maintained. For these and many other plant uses the cartridges are supplied with or without the housing.

Circle 721 on Readers' Service Card

Hi Life Screw Thread Form Will Be Shown by SPS

Booth 323

A striking visual demonstration of the advantages of a new socket-screw thread form will attract viewers to the exhibit booth of Standard Pressed Steel Co., Jenkintown, Pa. The improved thread form, the SPS Hi Life, boosts tension-screw fatigue life as much as 100 per cent. Now standard on the Unbrako line of socket-head cap-screws, the Hi Life threads will be demonstrated by a Polariscope.

UNIVERSAL TOGGLE-ACTION UNI-KLAMP

quick, positive, sturdy

Universal's Toggle-Action Uni-Klamps are engineered to give positive action with a minimum of force required for locking or unlocking. They're the fastest and most economical work-holding devices yet designed and they incorporate features recommended by independent tool designers, process engineers, tool makers and machinists. With clamp pressures available from 200 to 1200 lbs., there's a Universal Uni-Klamp in a size and type to suit your requirements. Write for catalog showing complete line.

TOGGLE LATCH TYPE CLAMPS

PUSH-PULL CLAMPS

PORTABLE CLAMPS

AIR OPERATED CLAMPS

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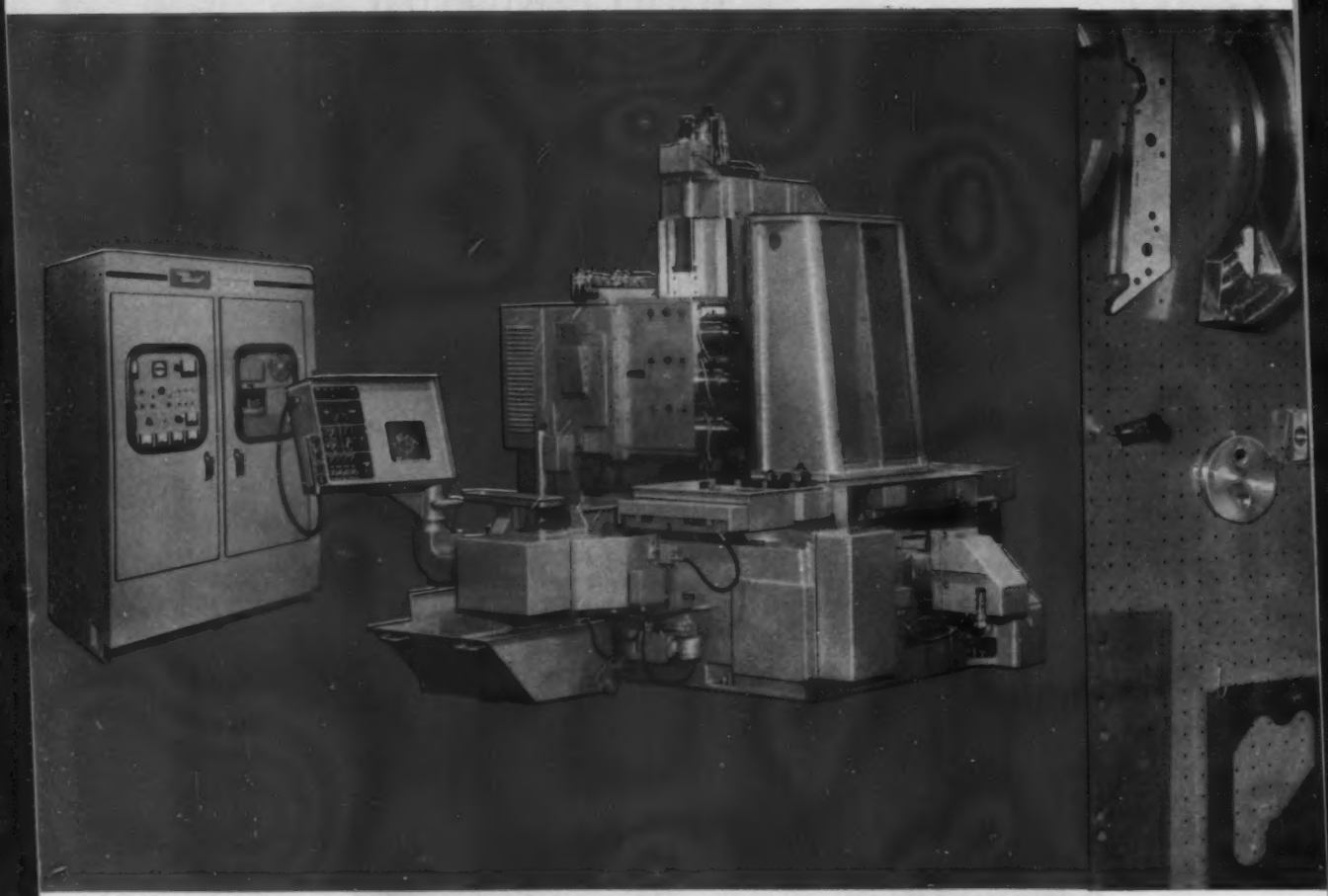
NOW—BENDIX OFFERS COMPLETE LINE

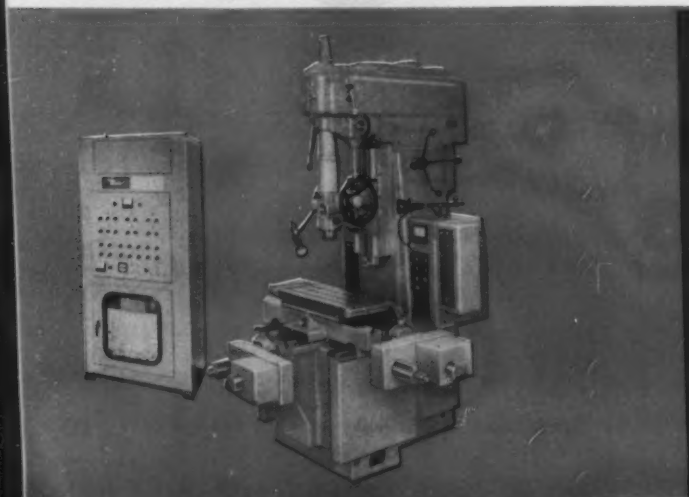


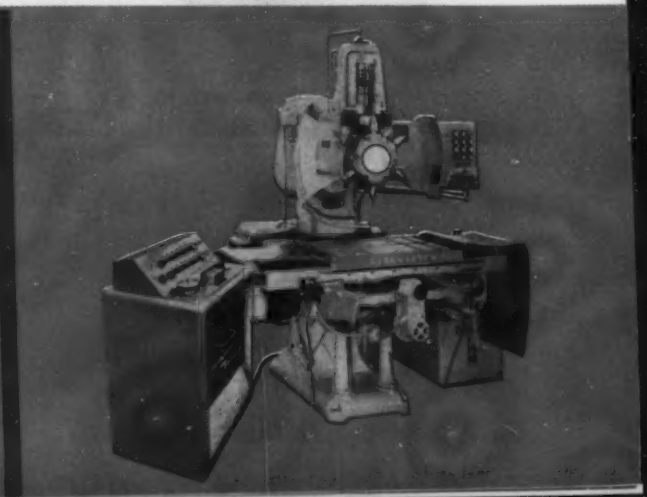
DYNAPATH-23 NUMERICAL CONTOURING CONTROL. Featuring *Circular Interpolation* to permit the close-tolerance machining of arcs and circles, as well as straight lines, with a minimum of input data. Offers 0.0002-inch resolution on 2, 3, or more axes of control. Each application individually engineered for the best possible combination of machine tool and control unit.

TREMENDOUS VARIETY of parts machined with Bendix numerical control shown here. Parts range from complex missile components to simple but extremely accurate cams.

DYNAPOINT-22 NUMERICAL POSITIONING CONTROL. Provides the finest electronic resolution available anywhere—0.000010″ for jig borer accuracies within 0.0001″ on finished parts. Uses 8-channel binary-coded decimal tape format—compatible with other N. C. units and with standard tape preparation equipment.

FERRANTI FP-22 NUMERICAL POSITIONING CONTROL SYSTEM. Floating zero for fast, easy set-up and low-cost tooling. Dial input provides manual operation flexibility. Wear and loss of accuracy eliminated because there are no contacting parts in measuring units.





OF NUMERICAL CONTROLS

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Tested and proven in scores of installations, over thousands of productive hours, Bendix numerically controlled contouring systems have become recognized as the finest. Based on this solid history of achievement, The Bendix Corporation now introduces its second generation control systems, the DynaPath-20 Series Numerical Contouring Controls, and the Dyna-Point-20 Series Numerical Positioning Controls.

To further extend its broad coverage of the numerical control field, Bendix has obtained exclusive rights to distribute the Ferranti tape controlled positioning units and Ferranti's unique coordinate measuring machine.

Bendix backs up the most complete line of numerical control equipment with the best and most complete service organization in this country. From application engineering through tape preparation, customer training and field service, Bendix has had more teamwork experience than has any other electronic controls manufacturer in the field.

Only at Bendix can the machine tool builder and user find everything he needs for numerically controlled manufacturing. Why not investigate Bendix PACKAGED PRODUCTIVITY today.

FERRANTI FI-22 COORDINATE MEASURING MACHINE. Checks workpieces up to ten times faster than conventional methods. Direct and continuous readout (in ¼-inch figures) of hole center locations with one-set-up simplicity. Accuracy of ±0.001" over entire 15" x 24" range.

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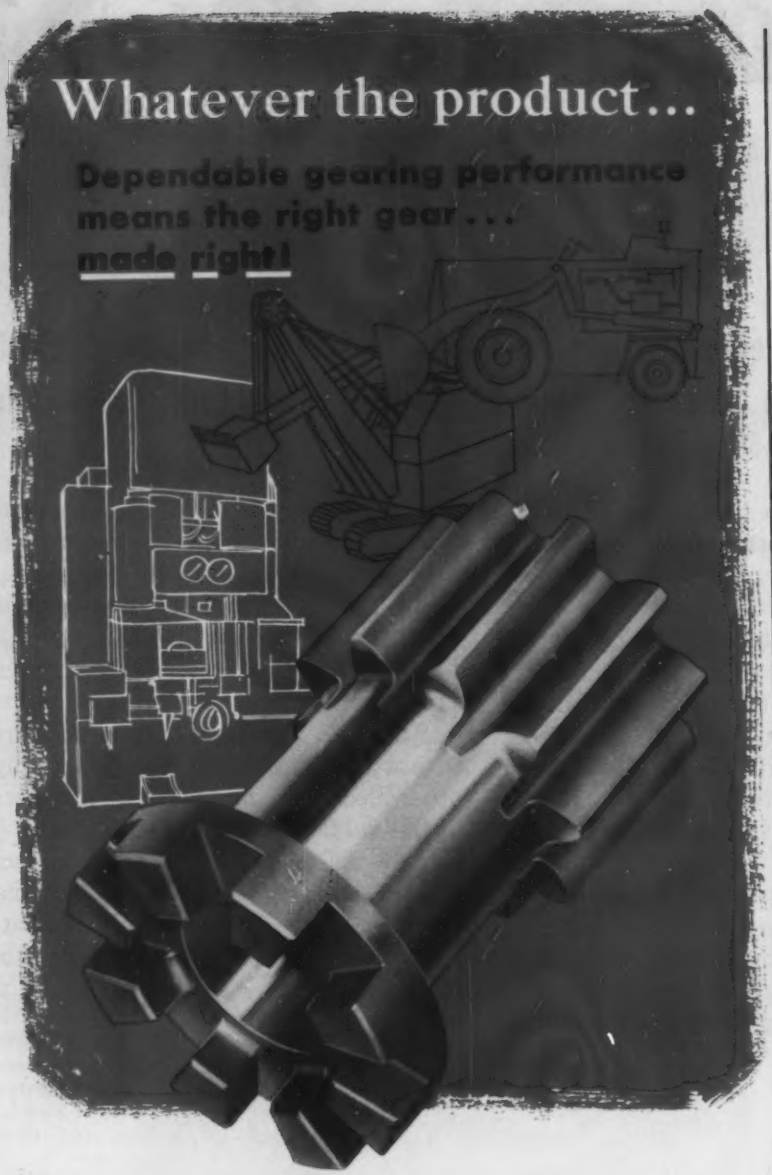
PRODUCTION ENGINEERING SHOW

Booth 530 • Navy Pier, Chicago • Sept. 6-16



Precision can be designed into any power transmission equipment. But precision performance results only when the gearing is made to the exact specifications for a particular application.

CINCINNATI Custom gears and gear boxes are precision made, precision inspected, GUARANTEED—*with delivery dates as promised!*

Send us your prints for quotation.

CINTI®

THE CINCINNATI GEAR CO.

Wooster Pike and Mariemont Ave. Cincinnati 27, Ohio
Custom Gear Makers Since 1907

GEARS, good gears only

The noticeable change in the new thread form is its smoothly radiused root. This greatly reduces failure-producing stress concentrations in a section of a tension screw—the least cross section of the thread—where an estimated 85 per cent of fatigue breaks occur. By contrast, the conventional thread root for socket-head capscrews and most other industrial fasteners for many years has been a flat root—a truncated V-shape with sharp, stress-building corners.

SPS will use a Polariscope to project images of the stress patterns in the thread forms under load. Polarized light passed through a special plastic model of the screw thread form under load is broken up into alternating bands of light and dark. The degree of stress concentration is indicated by the relative bunching of the lines about the points of discontinuity.

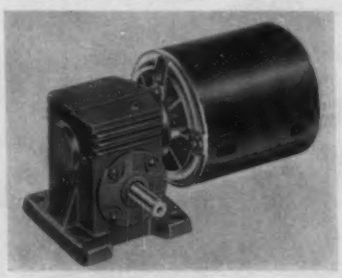
The SPS exhibit will also feature an operating automated setscrew driver which inserts up to 2500 set-screws per hour; one-piece self-locking Unbrako socket screws with Nylok inserts for reliable holding under shock and vibration conditions; and two miniature-size Hallowell shaft collars.

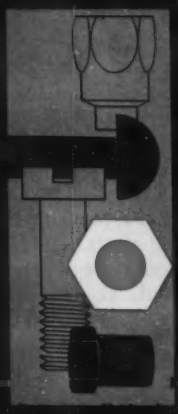
Circle 822 on Readers' Service Card

Small-Size Motorized Speed Reducer

Compact assembly for space-saving design is a feature of this M109 Ratiomotor introduced by Boston Gear Works, Quincy, Mass., and now available from the company's distributors. The horizontal right-angle drive is powered by a specially designed 1/20- or 0.035-hp motor, and provides a full range of output speeds from 43.8 to 350 rpm. A simple, standard mounting bracket permits easy mounting without mechanical alteration.

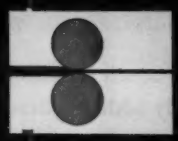
Circle 823 on Readers' Service Card





COLD HEADING MACHINERY

Cold Headers • Parts Formers • Nut Formers • Slotters • Threaders • Pointers • Trimmers and other Cold and Hot Forming Equipment

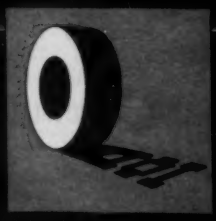


ROLLING MILL MACHINERY

Two-High and Four-High Mills • Special Mills • Sendzimir Mills • Rod Mills • Slitters • Coilers • Winders • Straighteners • Payoffs • Edgers • Coil Boxes • And Other Mill Equipment

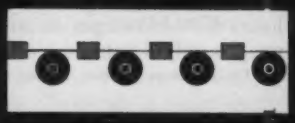
WATERBURY FARREL

MACHINERY BUILDERS



WIRE MILL EQUIPMENT

Continuous Tandem And Upright Cone Wire Drawing Machines • Bull Blocks • Wire Flattening Mills •



Swagers • Roll Pointing Machines • Spoolers • And Other Wire Equipment

POWER PRESSES

Cam and Crank Eyelet Machines • Horizontal Redraw Presses • Multiple Plunger Pillar Presses • High Speed Blanking Presses • Collapsible Tube Equipment • Ammunition Machinery, etc.

THE WATERBURY FARREL FOUNDRY & MACHINE CO.
DIVISION OF TEXTRON INC.
Waterbury, Connecticut • U.S.A.
Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.

WF 51R

WHY MICROHONING* of Accumulator Bores provides processing short cut

American Bosch Division of American Bosch Arma Corporation has recently added hydraulic cranking systems and a wide variety of hydraulic accumulators to their extensive line of precision equipment. Microhoning is specified as the only machining operation performed in the bores of the accumulator housings—here is why.

This horizontal Hydrohoner has a hydraulically reciprocated carriage, a ten-foot stroke and a four-speed transmission.

PROCESSING ECONOMY

The accumulator housings are made from mill stock tubing that is mostly either cold rolled welded or cold drawn seamless steel (some of the 4.750″ I.D. tubing is aluminum alloy). Economical processing of tube bores is realized through the inherent efficiency of Microhoning in generating geometry, size and surface finish. Microhoning is the only machining done on bores ranging in diameter from 3.000″ to 6.180″ and in lengths from 6.375″ to 123″.

RAPID STOCK REMOVAL

Accumulator bores are rough- and finished–Microhoned on the horizontal Hydrohoner shown. It is designed to provide rapid stock removal and generate accuracy in long bores. Rough-Microhoning of the mill stock tubing bores removes up to .040″ of stock at a rate of better than .001″ per minute. Finish-Microhoning removes .004″ of stock while generating final accuracies and specified surface finishes.

FUNCTIONAL BORES

In addition to consistent bores that are well within specified size and geometry tolerances, Microhoning provides controlled surface finishes of 7-8 microinches, rms. The Microhoned surfaces are so consistent that a check on a precision surface analyzer is made only two or three times per eight-hour shift. Microhoned bores assure smoother operation and longer life for piston seals in assembled accumulators.

**Registered U. S. Pat. Off.*

Visit Us In Booth 1225 — The Machine Tool Exposition

PRECISION PRODUCTION THROUGH MICROHONING

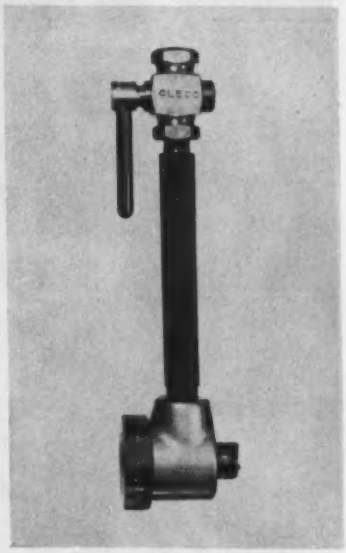
MICRO MATIC

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

"Cub Scaler" Ror Removing Rust and Scale

Close-quarter cleaning tool, called the "CC" Cub Scaler, introduced by Cleco Air Tools, a division of Reed Roller Bit Co., Houston, Tex. This tool is specifically designed for maintenance departments. It is a heavy-duty, valveless percussion device designed for fast removal of scale, rust, and paint. There are few moving parts, and only a negligible amount of maintenance is required. It rounds out an all-purpose line of Cleco scaling tools,



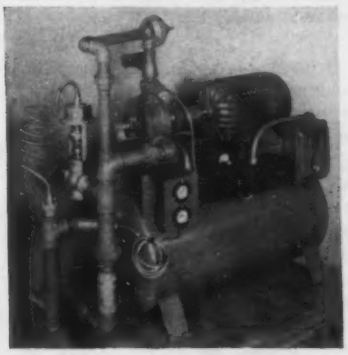
joining the "SC-3" Triple Scaler and the "BB" Cub Scaler. The "CC" Scaler is only 2 5/8 inches high, and when operating, only 3 1/8 inches high. The operating stroke is 5/8 inch and the piston diameter, 1 3/16 inches. This permits using the scaler in confined spaces, such as inside pipes or channels. The scaler operates on 9 cubic feet of air per minute, delivers 4700 blows per minute, and weighs only 3 pounds 8 ounces.

Circle 824 on Readers' Service Card

Water Economizer for Heating Equipment

Self-contained water recirculating system equipment, which is said to save upwards of 50 per cent in water consumption, designed for use with all induction

heating installations. The unit also contains a special electromagnetic device to control formation of scale and corrosion. This Ther-Monic water economizer was designed and built by the Induction Heating Corporation, Brooklyn, N. Y. An electromagnetic device on the supply end charges the solids of the water and prevents them from clinging to the storage tank or the inside of the plumbing. They simply pass through the sys-



tem and out the drain, thus preventing the formation of scale. Temperature of the water may be controlled at any setting in the range from 75 to 150 degrees F. by a dial on the automatic thermostatic valve of the inlet water line. A dial type thermometer indicates the temperature of the circulating water. The amount of water that can be saved depends upon water supply temperature and the maximum allowable temperature of the equipment being cooled. Drive for the pump is supplied by a totally enclosed, continuous-duty motor of 1 1/2 hp.

Circle 825 on Readers' Service Card

Aluminum-Oxide Abrasive

A new aluminum-oxide abrasive, developed for stainless-steel billet and slab grinding, has been introduced by the Norton Co., Worcester, Mass. It is called 75 Alundum because it was introduced during Norton Co.'s seventy-fifth anniversary year. Laboratory and initial field tests show that 75 Alundum wheels can remove twice as much metal as the best grinding wheels used before. The quick cutting and long wheel life reduces the cost per pound of metal removed by 40 per cent.

Circle 826 on Readers' Service Card

HOW MICROHONING of Accumulator Bores provides processing short cut

Fast, economical generating of specified bore size, geometry and surface finish in accumulator housings is required by American Bosch Division of American Bosch Arma Corporation. Housings are made from mill stock tubing and Microhoning is specified as the most suitable process to consistently and quickly generate precision bores. Here is how a horizontal Hydrohoner provides a processing short cut.

The flange-type tool used to Microhone the 6.180" I.D. tubing has 8" long stones and four fibre guides. These stationary guides pilot the tool into the bore and prevent "collapsed" abrasives from marking precision bore surfaces when withdrawing the tool.

SIMPLIFIED PROCESSING

Because Microhoning characteristics include: rapid stock removal; consistent machining to specified size; correction of geometric irregularities; and generation of micro-inch finishes, there is no need for any other machining operation. Rough-Microhoning of the bores removes up to .040" stock at a rate better than .001" per minute. Then the finish-Microhoning operation quickly generates final size, geometry and surface finish. Thus, processing is simple, quick and economical.

AUTOMATIC GAGING

Gage Air Microsize is used to automatically terminate the Microhoning cycle as each bore reaches specified size. Microsize controls are interlocked with Hydrohoner controls, and the reciprocating gage spindle is synchronized with the tool spindle. Therefore, at each withdraw stroke of the tool, the gage spindle attempts to enter the bore. When it enters the bore, the air back-pressure is increased and at a predetermined back-pressure the Hydrohoner is automatically stopped.

HIGH EFFICIENCY

Another factor contributing to the high efficiency of this Microhoning set-up is the electric rotary feed tool. This design provides constant feed speed and maximum cutting action. Also, with rapid expansion and "collapse" of abrasives, it assures shorter cycle time than obtainable with conventional hydraulic feed mechanisms.

Visit Us In Booth 1225 — The Machine Tool Exposition

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

For more data circle this page number on card at back of book

News OF THE INDUSTRY

California and Oregon

EATON MFG. CO., Cleveland, Ohio, has established a Pacific Coast regional office for its Dynamatic, Cleveland Worm & Gear, and Farval Divisions. RALPH E. BENNETT is regional manager with headquarters at 1485 Bayshore Blvd., San Francisco, Calif. The Pacific Coast region will include Vancouver and Seattle, Wash.; Portland, Oreg.; and Los Angeles and San Francisco, Calif.

DR. LUDWIG ROTH has joined Northrop Corporation as director of research in the company's NORAIR DIVISION at Hawthorne, Calif. He was formerly chief of preliminary design at the German rocket center in Peenemuende, and later assistant

Dr. Ludwig Roth, director of research for the Norair Division of the Northrop Corporation

director of the Army Ballistic Missile Agency at Redstone Arsenal. Dr. Roth directs Norair's applied research in manned aircraft, missiles, space systems, and advanced materials and processes.

RAYMOND L. DONALDSON has joined BESLY-WELLES CORPORATION, South Beloit, Ill., as service representative for its West Coast territory. He will operate out of the company's office at 3224 Union Pacific Ave., Los Angeles 23, Calif.

MICHAEL J. FINK, chief engineer, has been elected vice-president of the engineering department of MECHANICAL SPECIALTIES CO., Los Angeles, Calif.

PARKER-HANNIFIN CORPORATION, Cleveland, Ohio, announces the franchisement of DUPAR DYNAMICS CORPORATION, 1960 S. E. Hawthorne Blvd., Portland 14, Ore., as a distributor of Parker industrial tube and hose fittings, hydraulic accumulators, check valves, and Hydrelief and lever control valves; Crown compressed air regulators, filters, and lubricators; and Hannifin power cylinders and air-control valves. J. WILLIAM GARDINER is manager of the Portland operation. Extending technical assistance as needed is NORM G. BURKHARDT, Parker-Hannifin manager of distributor sales in the district that includes Washington and Oregon.

Georgia and Florida

NEW JERSEY ZINC CO., New York City, has established a district sales office in Atlanta, Ga., to provide improved service to its customers in the South. ROBERT W. MUNSON will be in charge as southern district sales manager. ANDREW G. MCFADDEN, who has served many of the customers in this territory, also will have his headquarters in Atlanta at 878 York Ave., S. W. HAROLD HEDDEN of Coral Gables will continue to act as consultant to accounts in the southern Florida area.

B. C. AMES CO., Waltham, Mass., has appointed TOOL ASSOCIATES, INC., Lake Worth, Fla., as sales agent for their micrometer dial indicators and gages. Tool Associates serves the entire state of Florida with gaging equipment and cutting tools.

Illinois and Indiana

JOHN R. METZGER and HOWARD A. COLLINS have been named to new sales posts with the RUSSELL, BURDSALL & WARD BOLT AND NUT CO., Port Chester, N. Y. Mr. Metzger —who has served at the company's Rock Falls, Ill., plant and, since 1949, as office manager in the Chicago sales office—returns to Rock Falls as sales supervisor at that plant. Mr. Collins joins the Chicago sales office after twenty-four years with the Buffalo Bolt Co., North Tonawanda, N. Y.

HOEFER MFG. CO., Freeport, Ill., announces that EMMERT A. TIMM, recently appointed general manager, has now been elected vice-president. In addition to his executive duties, Mr. Timm will continue as active head of the engineering department.

O. L. GIAUQUE has been appointed plant manager of Dana Corporation's AUBURN (Ind.) DIVISION. He succeeds RENE C. MCPHERSON, recently named executive vice-president of Dana's Canadian subsidiary, HAYES STEEL PRODUCTS, LTD., Merritton, Ont.

CHAMBERSBURG ENGINEERING CO., Chambersburg, Pa., has appointed MARSHALL & HUSCHART MACHINERY CO. of INDIANA, INC., Indianapolis, as representatives for central and southern Indiana and western Kentucky.

GERALD R. GARINGER has been promoted to branch manager for the CARPENTER STEEL CO., Indianapolis, Ind. He was formerly assistant branch manager in Toledo, Ohio.

Michigan and Wisconsin

RICHARD E. CLARK has been appointed manager of aluminum product sales at the Detroit, Mich., plant of JOSEPH T. RYERSON & SON, INC., Chicago, Ill.

VEET INDUSTRIES, East Detroit, Mich., announces the appointment of ANDREW CHARNEY as sales engineer for the VEET MACHINE TOOL DIVISION.

PRECISION GEARS, INC., has begun operations in its new $150,000 facility in Pewaukee, Wis., approximately 10 miles west of Milwaukee's city limits. The firm celebrated its forty-first anniversary when it moved into the 16,000-square-foot building.

coming attractions . . . NMTBA show: MMT-PE

A REVEALING, "See-for-Yourself" DEMONSTRATION OF WHAT BRAND NEW KRW PRESSES CAN DO

Above is a preview of K. R. Wilson's exhibit at the coming Machine Tool Exposition. Yes, there'll be 3 brand new KRW Presses on display... and each will be in action. Here, you'll see how both standard and special press requirements can be fulfilled by KRW most profitably for you. Come... visit KRW at the show... and bring your questions along. Factory engineers will be on hand to assist you in whatever way they can. K. R. Wilson, Inc., Arcade, N. Y.

DO IT NOW! PUT BOOTH 1444 ON YOUR "MUST SEE" LIST

KRW hydraulic presses

See (A) this modernized 200-ton Downstroke General Purpose Press . . . the latest version of KRW's popular 3700 Series (75-300 ton capacities).

See (B) this KRW 100-ton Opposed Ram Automatic Press at work. Designed for compacting refractory materials, abrasives, powdered metals, etc. Equipped with shuttle feed, hopper mechanism and automatic lubricator. (Capacities range from 20 thru 750 tons.)

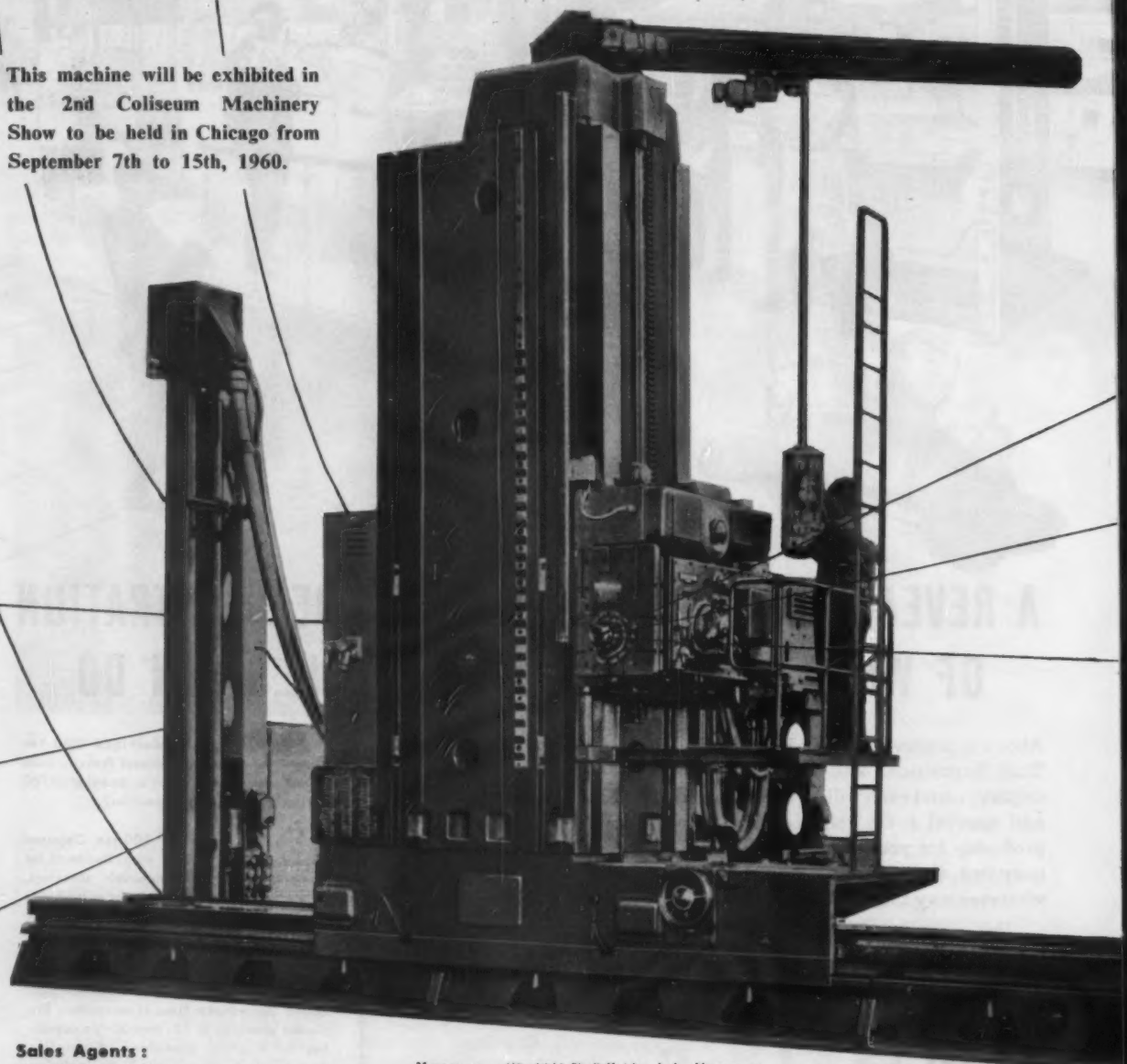
See (C) this new KRW 4-Column High Speed Downstroke Press in operation. Designed primarily in 10- thru 50-ton capacities for trimming operations (die casting flash, rubber, plastics, etc.). Basic design also adaptable to numerous operations such as light blanking, forming and die tryout.

MITSUBISHI INNOCENTI CWB

milling boring

MITSUBISHI ZOSEN KABUSHIKI KAISHA (Mitsubishi Shipbuilding & Engineering Co., Ltd.) take pleasure in announcing the conclusion of a license agreement with INNOCENTI S.G. of Milano for the manufacture and world-wide distribution of the universally known INNOCENTI-CWB MILLING, BORING & COMBINED MACHINES. The machines will be produced in Floor Type, Planer Type and other Combination Types, the diameters of spindles being 140 mm for milling and 95 mm for boring.

This machine will be exhibited in the 2nd Coliseum Machinery Show to be held in Chicago from September 7th to 15th, 1960.



Sales Agents :

New York : Mitsubishi International Corp., 120 Broadway, New York 5, N.Y.

Los Angeles : Mitsubishi International Corp., Los Angeles Branch, 606 South Hill St., Los Angeles 14, Calif.

Chicago : Chicago Representative of Mitsubishi International Corp., Room 1803, Prudential Bldg., 130 East Randolph Drive, Chicago, Ill.

Vancouver : Mitsubishi Shoji Kaisha, Ltd., Vancouver Branch, 210 Toronto Dominion Bank Bldg., 717 West Pender St., Vancouver 1, B.C.

London : Mitsubishi Shoji Kaisha, Ltd., London Branch, 104/106 Leadenhall St., London, E.C. 3

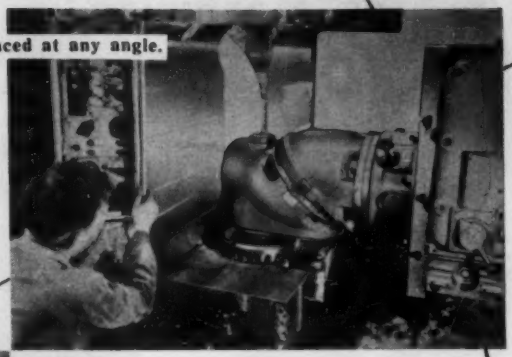
Paris : Paris Liaison Representative of Mitsubishi Shoji Kaisha, Ltd., c/o Mr. G. Bouvet, 5, Rue Boudreau, Paris 9

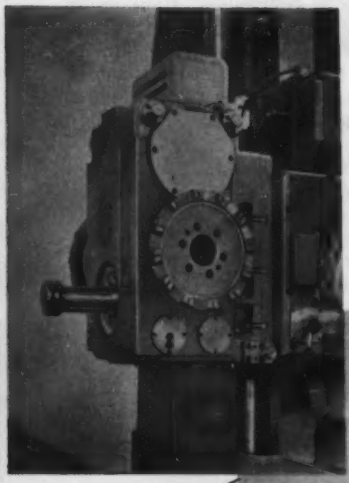
Duesseldorf : Deutsche Mitsubishi Export & Import-Gesellshaft m.b.H., 12 Grunstrasse, Duesseldorf

Melbourne : Mitsubishi (Australia) Pty., Ltd., Melbourne Office, 1st Floor, Houghton House, 543 Little Collins St., Melbourne, C. 1, Victoria

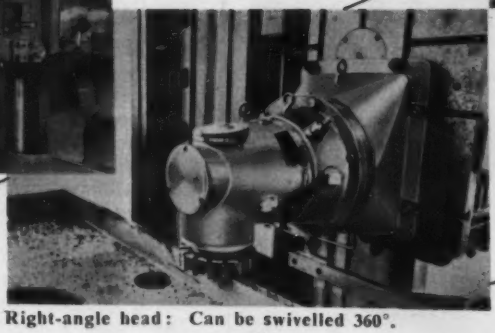
and combined machines

Universal head: Can be placed at any angle.



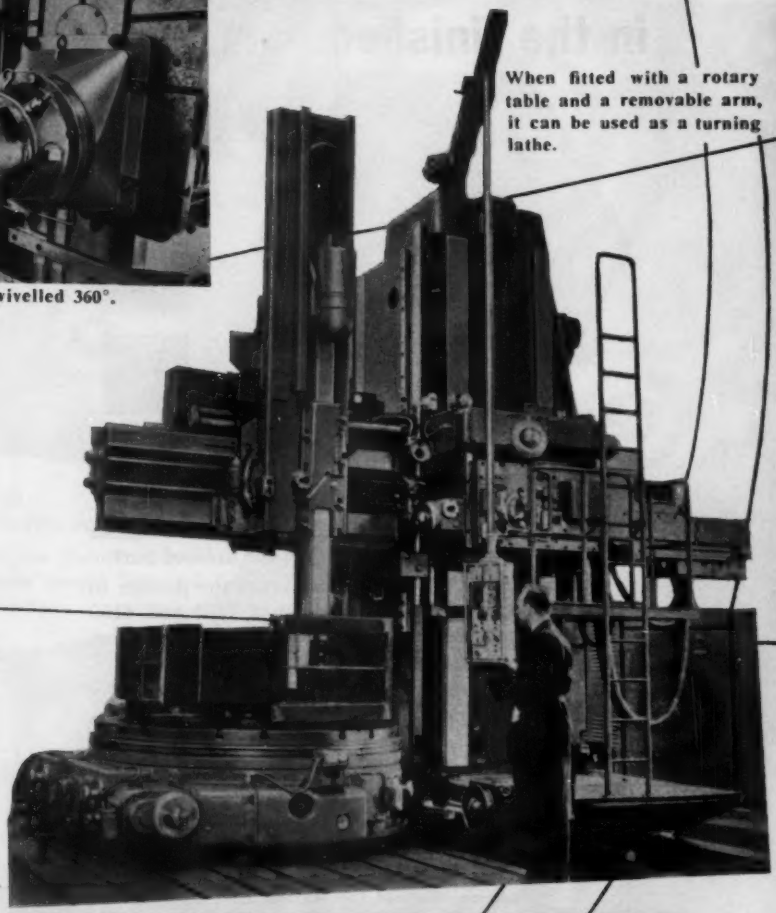


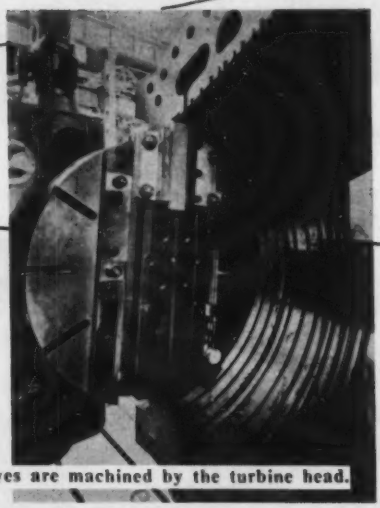
Milling can be done on three faces by the three way head.



Right-angle head: Can be swivelled 360°.

When fitted with a rotary table and a removable arm, it can be used as a turning lathe.





Grooves are machined by the turbine head.

MITSUBISHI ZOSEN

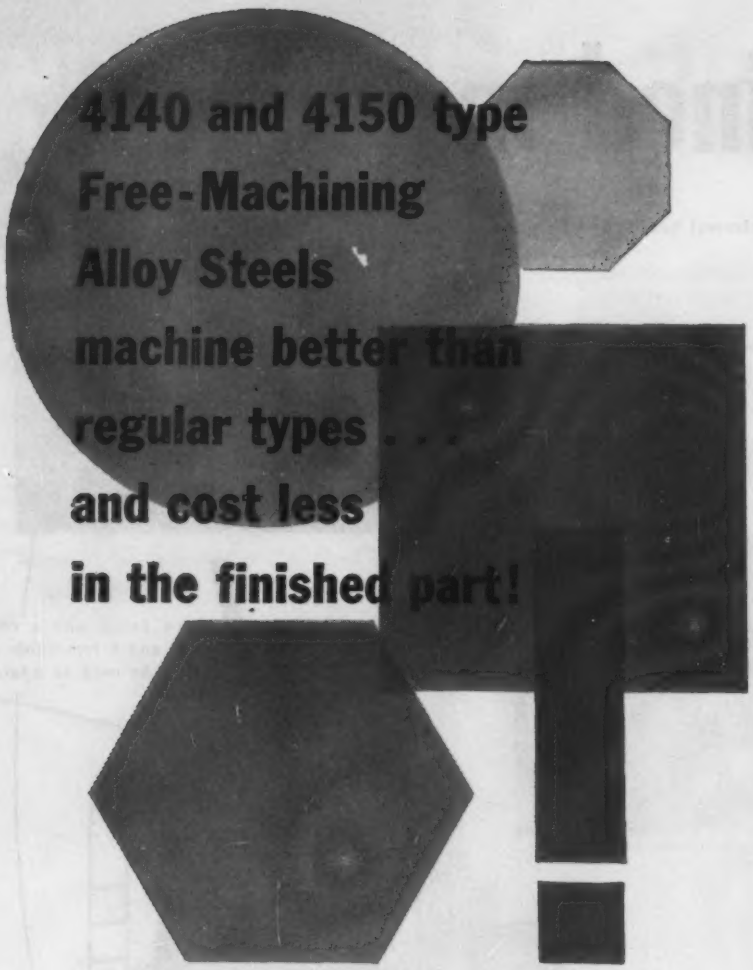
(MITSUBISHI SHIPBUILDING & ENGINEERING CO. LTD)

Head Office: Marunouchi, Tokyo, Japan

Machine Tool Manufacturing Division:

HIROSHIMA PRECISION MACHINE WORKS

Hiroshima, Japan



Wheelock, Lovejoy is your best source of 4140 and 4150 type free-machining alloy steels, the easy-working steels that machine far better than regular type steels, and which cost *less* in the finished part.

Wheelock, Lovejoy, for many years the pioneer in the development and application of 4140 and 4150 type free-machining alloy steels, offers you the most extensive stocks anywhere, in all W-L warehouses.

Available variety of 4140/50 type free-machining stock includes round, square, flat, billets, and forgings to specifications.

For best stocks, best service, get in touch with your nearest Wheelock, Lovejoy warehouse.

W-L STEEL SERVICE CENTERS — Cambridge • Cleveland Chicago • Hillside, N. J. • Detroit • Buffalo • Cincinnati
AGENTS — Southern Engineering Company, Charlotte, N.C.; Sanderson-Newbould, Ltd., Montreal and Toronto

"The Alloy Steel Center"

WHEELOCK, LOVEJOY & COMPANY, INC.
138 Sidney Street, Cambridge 39, Mass.

STEEL SERVICE CENTER INSTITUTE

Missouri and Texas

PARKER-HANNIFIN CORPORATION, Cleveland, Ohio, announces the appointment of ELLIS AKIN ENGINEERING CO., INC., 2934 Cherry St., Kansas City, Mo., as a distributor for Parker industrial tube and hose fittings and Hannifin power cylinders and air-control valves. RICHARD J. STAIHR is sales manager for Ellis Akin. Cooperating with the firm is KEITH R. DETRICH, Parker-Hannifin manager of distributor sales in the mid-continent district.

CLECO AIR TOOLS, a division of the Reed Roller Bit Co., Houston, Tex., has announced the completion of plans for a far-reaching expansion program. Plans include a decentralization of management responsibilities through the creation of two regional manager positions and the establishment of a manager of sales development position. E. G. CLARK, formerly Newark division manager, has been promoted to regional manager for Cleco's Newark, Detroit, and Chicago divisions. His area of responsibility covers approximately the northern half of the U.S. J. G. HUDSON, formerly assistant to the sales manager, is now regional manager for the Houston, Atlanta, St. Louis, and Los Angeles divisions. This territory covers the southern and western portions of the U.S. R. V. GILLISPIE, formerly Cleco personnel manager, has been named manager of sales development.

New England

VICKERS INCORPORATED, division of Sperry Rand Corporation, Detroit, Mich., has established a new manufacturing facility for cylinders in Waterbury, Conn. Designed for manufacturing standard hydraulic cylinders for the industrial, marine, and ordnance fields, the new plant includes complete engineering, manufacturing, processing, raw stores, and warehousing facilities. It will enable Vickers to provide off-the-shelf service to its customers, and to furnish nonstandard cylinders, as well as prototypes to meet special requirements.

J. T. SLOCOMB CO., South Glastonbury, Conn., announces the appointment of MERIT MACHINERY, INC., 2311 Babcock Blvd., Pittsburgh 37, Pa., as a selected distributor of their line of micrometers and industrial measuring instruments. Also appointed exclusive factory representatives are CLIFF WARNER SALES CO., covering the states of Colorado, Wyoming, Montana, Utah,

Announcing the New

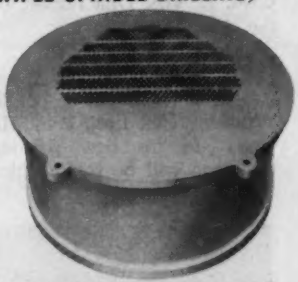
MULTI-NUMETRIC Numerical Control

(AS APPLIED TO MULTIPLE SPINDLE DRILLING)

Expertly Designed MOLINE "HOLE HOG"

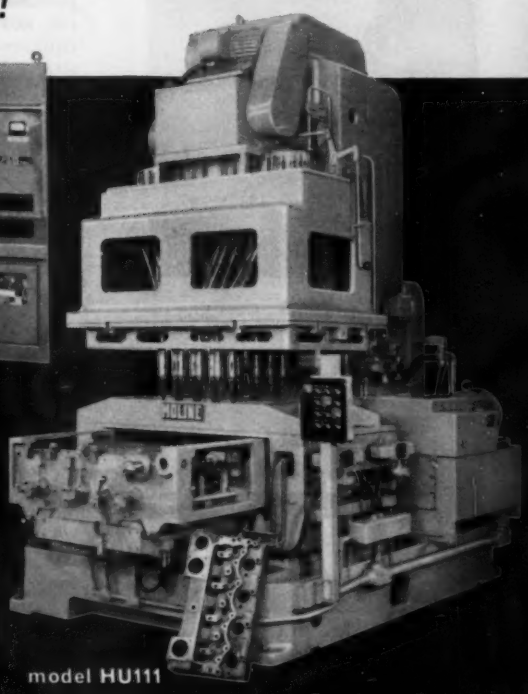
Machine Tools for—

- *Greater Production*
- *Efficiency*
- *Savings!*



Tube Sheet drilled and reamed by Model HD68 Multiple Spindle Machine. The drilled steel plate is approximately 48" diameter and 1½" thick.

model HD68 Tube Sheet Drilling Machine with Multi-Numetric Numerical Control for positioning of machine table in two directions and for selection of spindles. Information on punched tape permits automatic drilling of a complete hole pattern in a tube sheet without interruption.



model HU111

Hydraulic Feed, Universal Joint-Type Drilling Machine with 24" x 50" drilling area and with forty-two 1¾" spindle drivers, each with two-speed and neutral adjustment. Thirty-six spindles in slip spindle plate, and power shifting fixture, handle drilling and reaming of three different engine cylinder heads.

60 years of Machine Tool Engineering experience is at your service for

- **Multi-Spindle Boring**
- **Straight Line Multi-Drilling**
- **Single and Multi-Spindle Honing**
- **Adjustable Spindle Drilling**
- **Special Multiple Operation Machine Tools**

model MR149

Single Spindle, Horizontal, Hydraulic Feed, Automatic Boring Machine for rough and finish boring two different styles of 3, 4, 5, 6 and 8 cylinder compressor housings to receive wet-type cylinder sleeves.

Examples of compressor housings bored by MR149 machine. Automatic indexing fixture on machine turns the housing radially and shifts it longitudinally to bring each hole to correct location for boring and facing.

MOLINE TOOL CO. HOLE-HOG MOLINE, ILLINOIS

MOLINE TOOL COMPANY

100 20th STREET • MOLINE, ILLINOIS • ***REPRESENTATIVES IN PRINCIPAL CITIES***

New Mexico, and Idaho; KENNETH B. KOMP SALES Co., covering southern California and Arizona; and CARL E. VON DER HEIDE, covering the state of Michigan.

GORDON W. SMITHSON has been named chief engineer of PRATT & WHITNEY Co., INC., West Hartford, Conn. In his new position, Mr. Smithson will be responsible for all engineering activities of the company, reporting directly to the president.

Gordon W. Smithson, chief engineer of Pratt & Whitney Co., Inc.

RIVETT, INC., Boston, Mass., has appointed SCOTT INDUSTRIAL EQUIPMENT Co., 3019 N. Illinois St., Indianapolis, Ind., as exclusive distributor in the states of Indiana and Kentucky for their lines of air and hydraulic valves and cylinders. In addition, HYD-AIR, INC., 11536 Reading Road, Sharonsville, Cincinnati, Ohio, has been appointed as exclusive distributor in the Cincinnati area.

WALTER J. BISSINGER has been appointed sales promotion engineer for gear-tooth induction-hardening equipment in the GOULD & EBERHARDT DIVISION of the Norton Co., Worcester, Mass. Mr. Bissinger was associated with Gould & Eberhardt from 1939 to 1959 and joined Norton when it purchased G & E.

PLASTICS MACHINERY DIVISION of National Automatic Tool Co., Inc., Richmond, Ind., announces the appointment of ACME MACHINERY & MFG. Co., INC., 102 Grove St., Worcester, Mass., as its New England distributor for the Natco line of plastics injection molding machines.

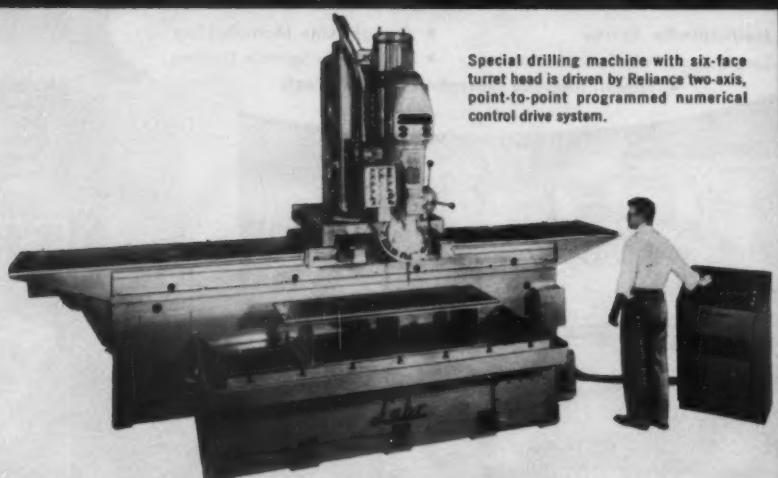
MORSE TWIST DRILL & MACHINE Co., New Bedford, Mass., has appointed JOHN J. DEVLIN as sales representative in northern New Jersey and in Rockland and Dutchess counties, N. Y.

NORTON Co., Worcester, Mass., announces the appointment of K. DALE SWANSON as abrasive engineer for the southwestern section of Los Angeles County, Calif. He was formerly field engineer in the company's Pacific Coast district office in Los Angeles. In addition, JOHN M. NELSON has been named field engineer at the Chicago district office, and IVAN A. JOHNSON, JR., has been appointed abrasive-grain engineer in the company's Chicago-Indianapolis territory. J. ROBERT LOWRY is now a field engineer in the company's Atlanta, Ga., district, and ROBERT D. STUBBLEBINE has been named a field engineer in the Detroit, Mich., district.

CHARLES N. HALL has been named chief grinding engineer for the HEALD MACHINE Co., Worcester, Mass. He succeeds CLIFFORD G.

RELIANCE PROGRAMMED NUMERICAL CONTROL

a complete system for automatic positioning of machine tools



Special drilling machine with six-face turret head is driven by Reliance two-axis, point-to-point programmed numerical control drive system.

Cutting the costs of lead time and expensive tooling, as well as maintaining high accuracy, Reliance Programmed Numerical Control brings to industry a complete, engineered positioning system. Using resolvers, or resolvers with scales and sliders, extremely accurate position information is compared with the numerical input, and the difference used to drive the positioning motors.

MENARD who has been named consulting engineer for the engineering and research departments. A veteran of twenty-one years with Heald, Mr. Hall served most recently as a field sales engineer at the company's Detroit branch office.

CARL B. KLOCKARS has been appointed to the newly created post of assistant manager—machine tool sales, of TAFT-PEIRCE MFG. CO., Woonsocket, R. I.

BUTTERFIELD DIVISION of the Union Twist Drill Co., Derby Line, Vt., announces two new appointments in its sales engineering force. FRANK R. SANNING will cover Vermont, western New Hampshire, and western Massachusetts, with headquarters in Worcester, Mass. JAMES M. M. GRANGER will cover western Michigan, with headquarters in Grand Ledge, Mich.

New York

ROBERT S. WRIGHT has been elected vice-president—international trade of U. S. INDUSTRIES, INC., New York City. Mr. Wright will be charged with coordination of the company's over-all international trading activities. In addition, he will be directly responsible for the operation of the company's International Division, of which he has been president for the past two years.

Robert S. Wright, newly elected vice-president — international trade, U. S. Industries, Inc.

GLEASON WORKS, Rochester, N. Y., announces the retirement of FREDERICK E. MCMULLEN after forty-six years of service. Mr. McMullen had served in many capacities in the company's engineering department and was instrumental in introducing first, the spiral bevel gear and later, the hypoid gear in the automotive industry. He was elected to the board of directors in 1950, and in 1951 was elected vice-president in charge of engineering.

Frederick E. McMullen, retired vice-president in charge of engineering of the Gleason Works

The Reliance drive provides fast, high accuracy positioning by operating the motors at high speed until the final position is approached. The motors are then slowed down in proportion to the distance from the programmed point, stopping at the exact position. Any number of linear or rotary motions can be controlled simultaneously or individually for completely automatic operation. Provision can also be made for auxiliary functions such as turret selection, clamping, and coolant control.

Reliance Programmed Numerical Control utilizes 8 channel tape or dial selector switches for input. Numerical indicator tubes can be provided for readout.

Here is what you get when you buy Reliance:

- Absolute system—operates from zero reference with no cumulative error.
- Positions from either direction.
- Uses standard machine tool tape, with standard tape processing and reading equipment.
- High Accuracy—electrical accuracy of ± .0001 inch and repeatability of .00001 inch can be achieved.
- Powered by Reliance Super "T" D-c. servo motors . . . small diameter, low inertia, dynamic response.

Reliance systems are of industrial construction, and are sold and serviced by a nationwide organization. For more productive machine time, for greater machine utilization, you'll want to know the complete facts about Reliance Programmed Numerical Control. Call your nearest Reliance Sales Engineer, or write direct.

See the Reliance Numerical Control in operation at the Production Engineering Show, Navy Pier, Chicago, Ill., Sept. 6-16, Booth 411-417

D-1678

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 39A, CLEVELAND 17, OHIO

Canadian Division: Toronto, Ontario

Sales Offices and Distributors in Principal Cities

Duty Master A-c Motors, Master Gearmotors, Reeves Drives, V★S Drives, Super "T" D-c. Motors, Generators, Controls and Engineered Drive Systems

OAKITE PRODUCTS, INC., New York City, announces the assignment of four representatives to the company's technical field service staff. LON E. WELCH, formerly a representative in Akron, Ohio, has been transferred to Kokomo, Ind., where he replaces DANIEL B. LAMB who was recently appointed manager of the company's Detroit division. GEORGE E. PARK has been assigned to the Springfield, Mo., territory; and JAMES D. ENSTAD has been appointed representative in St. Paul, Minn. EDMOND L. MALONE has been assigned to New Jersey's Union and Middlesex Counties.

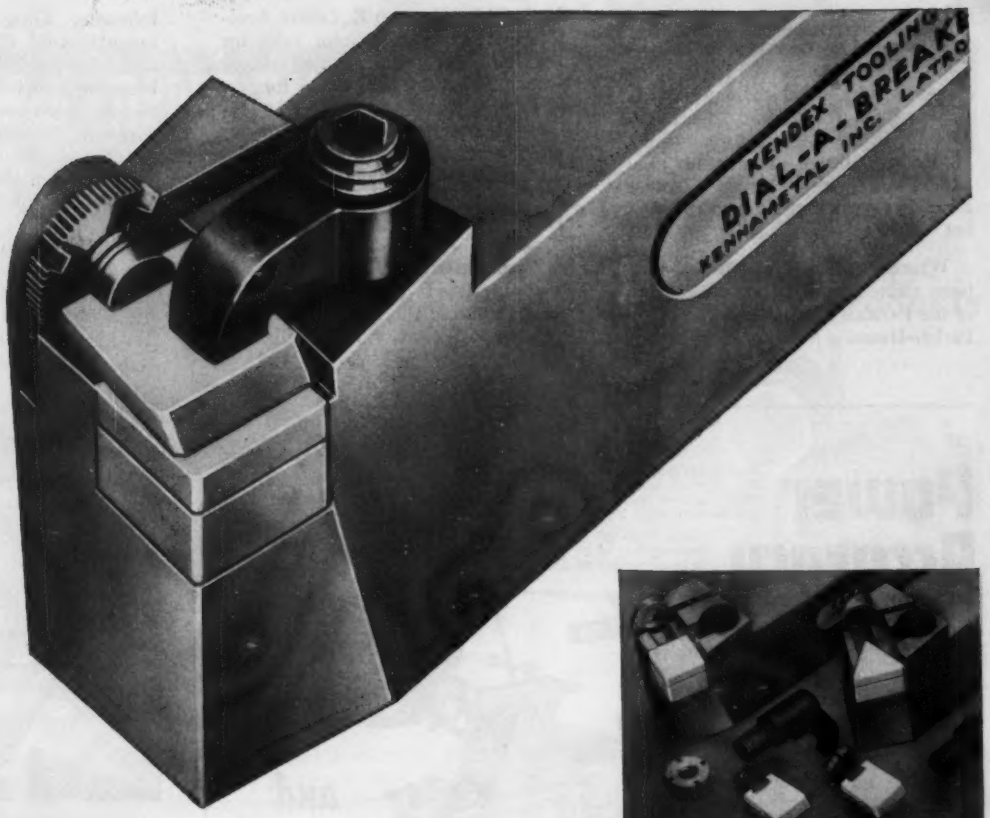
WALLACE MACGREGOR has been appointed president of CLIMAX MOLYBDENUM CO., and elected vice-president of AMERICAN METAL CLIMAX, INC., New York City, the parent company. In his new post as president of Climax Molybdenum, Mr. Macgregor succeeds Frank Coolbaugh who has held that position since June, 1959.

GLEASON WORKS, Rochester, N. Y., announces new executive appointments in its engineering, sales, and production departments. RAYMOND W. DOELL, vice-president, assumes over-all administration of engineering activities as engineering manager. He has been with the company for forty-three years. ROBERT F. PIGAGE, associated with Gleason for twenty years, has been appointed chief engineer of the company's newly organized basic engineering research section. HARRY J. HART, a nineteen-year veteran with the company, has been advanced to the post of liaison engineer to serve as coordinator between the engineering and sales departments. New sales manager is JOHN SOMERSET who has been with Gleason for twenty-three years. IRVING W. PEACHEY, with Gleason for nineteen years, has been named assistant sales manager. The appointment of RALPH F. MURPHY as production manager was also announced. Mr. Murphy has been with the company for thirty-eight years.

Raymond W. Doell, vice-president and engineering manager of the Gleason Works

John Somerset, sales manager of the Gleason Works

2956
DIE-PART®
PROGRESSIVE
DIE MAKERS...
Exclusively Yours!
HAMILTON TOOL
A portable device for maintenance, fitting, and testing of dies. Increases accuracy and reduces costs invariably. Install it and change your competitive situation overnight. Be able to under bid competition . . . and yet show a profit.
Bulletin No. 2956 gives complete details. Ask for it. FREE!
THE HAMILTON TOOL COMPANY
834 SOUTH NINTH STREET
HAMILTON, OHIO



NEW KENDEX*
DIAL-A-BREAKER*
Easily adjustable . . . attached chipbreaker

Quickly, easily . . . set the chipbreaker where you want it, regardless of holder position. The new Kendex Dial-A-Breaker eliminates fumbling and fussing while changing and adjusting chipbreakers and inserts. Chipbreaker is brazed to its adjustment screw. *It can't fall out, and the breaker setting may be retained while indexing or changing inserts.*

You no longer need a different breaker for every cutting job. Now you just turn the dial and position one chipbreaker for *several* jobs. Minimum of parts to stock . . . only two chipbreakers required for 70 styles and sizes of holders.

Close ganging of tools presents no adjustment problems with the Kendex Dial-A-Breaker. *All* changes and adjustments . . . chipbreaker and insert . . . can be made from the top of the holder. (The clamp screw is also accessible from the bottom of the tool when mounted in an inverted position on the rear carriage.)

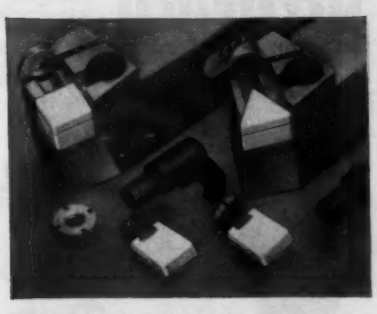
Kendex Dial-A-Breaker Tool Holders have the same basic design and accommodate the same solid Kennametal shims and "throw-away" inserts as used in standard Kendex holders. They are available in positive or negative rake, and with square or triangular inserts.

Get more information. Ask your Kennametal Representative for a demonstration . . . or write KENNAMETAL INC., Latrobe, Pa. 33501

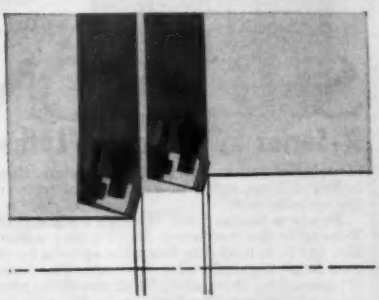
*Trademark

INDUSTRY AND **KENNAMETAL**
. . . Partners in Progress

SEE IT IN CHICAGO SEPT. 6-16
MACHINE TOOL BUILDERS SHOW
International Amphitheater
North Hall • Second Floor
Booth 1500 • Adjacent to Restaurant
PRODUCTION ENGINEERING SHOW
Navy Pier • Booth 111



Holders illustrated with clamps and chipbreakers removed show positive seating of both triangular and square inserts. When not required, tool may be used without chipbreaker, with clamp set directly on the insert.



Easily accessible for adjustments. Permits close ganging of tools.

Easy adjustment, regardless of tool position. Just release the clamp and "dial" the breaker to any position desired.

For more data circle this page number on card at back of book

Ohio

DANA CORPORATION, Toledo, Ohio, has appointed JOSEPH E. STARICH as general manager of its wholly owned subsidiary, GENERAL DROP FORGE CORPORATION, Buffalo, N. Y. Mr. Starich assumes his new post after having served General Drop Forge as general superintendent.

WILLIAM E. BALLANTYNE has been named assistant sales manager of the PARKER HYDRAULICS DIVISION, Parker-Hannifin Corporation, Cleveland, Ohio. HAROLD E. LEWIS, heretofore head of distributor sales for the division, has been named service manager. JOHN E. SACKETT, formerly service manager, is being transferred to become a Parker-Hannifin district manager of mobile equipment component sales, working out of the Cleveland sales office at 17325 Euclid Ave.

HILL ACME CO., Cleveland, Ohio, has purchased outright the entire product line of the KLING BROS. ENGINEERING WORKS, Chicago, Ill. The following Kling products will be manufactured, distributed, and serviced from the Hill Acme plant: combination punch and shears, rotary shears, high-speed friction saws, pyramid bending rolls, universal punches, double-angle shears, guillotine shears, angle bending rolls, and pinch plate rolls.

R. G. SCHNEIDER has been appointed manager of engine lathe sales for the R. K. LEBLOND MACHINE TOOL CO., Cincinnati, Ohio. He formerly was field sales and engineering manager for the J. H. Elliott Co., Washington, D. C.

R. G. Schneider, newly appointed manager of engine lathe sales, R. K. LeBlond Machine Tool Co.

MAURICE GORMLY has been appointed manager of the PRODUCTS DIVISION of the Cincinnati Milling Machine Co., Cincinnati, Ohio. He succeeds PHILIP O. GEIER, JR., who

Maurice Gormly, newly appointed manager of the Products Division, Cincinnati Milling Machine Co.

Power Accuracy and Price

Photograph (actual size) of chip cut on R Series 15" Sheldon lathe. Depth of cut .250", Feed .018", Spindle Speed 400 r.p.m., Steel B-1112, Dia. of Work Piece 3".

"Free Running" spindle (Patent Pending) has no drive pressures to cause deflection. (See cut-out below.)

SHELDON

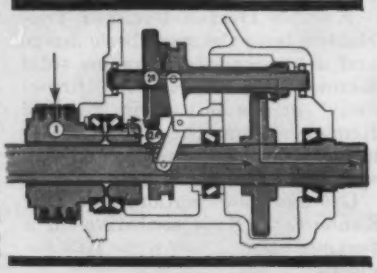
R-Series 15" Precision Lathes

Revolutionary in concept and design, these lathes deliver extra power and accuracy to the spindle nose.

Power is transmitted through 3 steel cable V-belts to the headstock input pulley assembly. (1) It is held free from the spindle by its own large tapered roller bearings. The input (1) assembly, then, absorbs all the drive pressures and transmits power to the free running spindle through a clutch (2A) in direct drive or gears (2B) in back gear drive.

This design (Patent Pending) eliminates spindle deflection resulting from drive pressures and leaves the spindle free for accurate work holding. Spindle nose runout is .0003" or less.

Other features include large 1⅛" hole through spindle . . . 60 pitch gear box with built-in lead screw reverse lever . . . apron that runs in oil and has independent drop lever clutches for power feeds . . . cam action tailstock clamp for rapid locking and instant release.



Write for bulletin and sample accuracy test sheet.

SHELDON MACHINE CO., INC. 4246 KNOX AVE., CHICAGO, ILL.

SEE US AT BOOTH 240 PRODUCTION ENGINEERING SHOW
SEPTEMBER 6 - 16 NAVY PIER CHICAGO, ILLINOIS

ANOTHER TALIDE CASE HISTORY. . .

Talide®-TIPPED HAMMERS LAST 50 TIMES LONGER!

. . . at Pulverizing Machinery Division of AMERICAN-MARIETTA COMPANY

Typical open view at right illustrates No. 3 Mikro-Pulverizer in operation.

Pulverizing Machinery Division of American-Marietta Company, Summit, New Jersey, leading producer of pulverizers, dust collectors and air conveyors, reports *longer service life* and *improved machine operation* with Talide-tipped hammers.

Forged steel hammers tipped with super-hard TALIDE METAL wear strips ⅛ x ⅜ x 2½" pulverize 50 times more tonnage than possible with alloy steel hammers on all kinds of applications, including grain, tobacco, coal, ore, minerals, etc.

TALIDE METAL . . . wear-proofs vital parts on machine tools, presses, pumps, compressors, and other types of processing equipment used in countless industries. METAL CARBIDES CORP., YOUNGSTOWN 12, OHIO

Write for Cat. 59-G today!

METAL CARBIDES CORPORATION

TALIDE®

YOUNGSTOWN 12, OHIO

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

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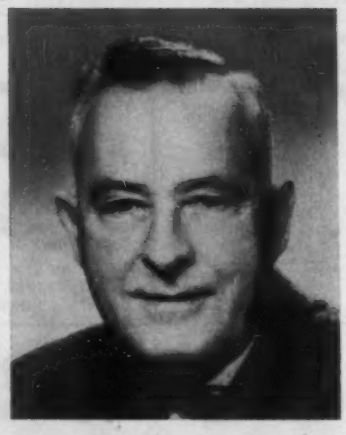
is now vice-president and assistant general manager of the parent company. Mr. Gormly has been with Cincinnati Milling since 1951. Prior to his new position he was director of the grinding wheel laboratory and manager of the grinding wheel plant.

TIMKEN ROLLER BEARING CO., Canton, Ohio, has made two changes in its engineering division. H. J. URBACH, formerly company executive engineer, has been given the title of director of engineering. RALPH E. MCKELVEY, formerly assistant chief engineer of the physical laboratories, has been promoted to assistant director of engineering.

CRUCIBLE STEEL COMPANY OF AMERICA, Pittsburgh, Pa., announces the appointment of JOSEPH W. DUBA as manager of its sales branch in Cincinnati, Ohio. Mr. Duba, formerly assistant manager at the branch, fills a vacancy created by the transfer of RICHARD J. RAND to Pittsburgh, where he will take over as branch manager.

HERBERT T. FLORENCE has been elected president and general manager of the CLEVELAND CRANE & ENGINEERING CO., Wickliffe, Ohio. He succeeds CHARLES F. SAFREED, who has been made chairman of the board. Also advanced were WILLIAM J. RYAN, who became vice-president and assistant general manager; and RALPH FORD, who was made assistant secretary in addition to his present position as plant superintendent. New directors to the board are EDWARD J. JENKINS, controller, and RICHARD A. MICHELSON.

Herbert T. Florence, president and general manager, Cleveland Crane & Engineering Co.



Charles F. Safreed, chairman of the board, Cleveland Crane & Engineering Co.

JOHN A. MENSTER has been named manager of welded tubing sales for the Babcock & Wilcox Co.'s TUBULAR PRODUCTS DIVISION, Beaver Falls, Pa. He succeeds LEON E. JEANNERET, retired. Mr. Menster will make his headquarters at the Alliance, Ohio, plant of the division.

Fastest Cutting of Tubes of all shapes from 1/8" to 4" O.D.
Grieder Tube Cut-Off Machines will give you from 4500 to 6500 cut-offs per hour—round, square, oval, hexagonal, rectangular—from tubes 1/8" to 4" O.D. No other machines provide such speeds. Note further:
● They cut tubing to any length.
● Steel, copper, brass, aluminum, alloys.
● Length tolerance plus or minus .002" on light wall tubing, .003" on heavier.
● Precision clamping dies prevent tube distortion, guarantee a quality cut. Tube does not rotate.
● Operation is fully automatic.
Write for literature describing the four Grieder Tube Cut-Off Machines and Automatic Loaders and Feeders.
GRIEDER INDUSTRIES, INC.
P.O. Box 169 • Bowling Green, Ohio
Grieder
TUBE CUT-OFF MACHINES
No. 1000-MAC cuts tubes of all shapes up to 3/4" O.D.
No. 4000-MAC cuts tubes of all shapes up to 4" O.D.

Another New **ARO** Air Motor Produces

SUPER POWER

...brings you

SUPER PERFORMANCE *in new* ARO "2200 Series" TOOLS!

1 For SCREWDRIVING
Forward rotation. Quiet exhaust. Model 7856 illustrated, 2,400 RPM. Adjustable clutch.

2 For DRILLING
Big power in compact size! Quiet exhaust. Model 7846 illustrated, 2,400 RPM.

3 For SANDING
Right-angle sander. Quiet exhaust. Model 7944 illustrated, 3,500 RPM. Polishers also available.

4 For GRINDING
Short grinder, aluminum housing. Quiet exhaust. Model 7872 illustrated, 18,000 RPM.

5 For NUTSETTING
Heavy-Duty, Right-Angle. Direct Drive. Model 7825 illustrated, 800 RPM.

Mighty—and eager to prove it! This great new series of ARO super-powered tools gives you more brute power per pound! More speed to slash costs on a wide range of assembly jobs. Greater safety, too—no shock or spark hazard.

Every tool is precision-built, and is more easily adaptable to your specific application. Your ARO Distributor invites you to job-test these new cost-saving tools *now* without obligation!

ARO

®AIR TOOLS
Also Air Hoists . . . Automation Tools
THE ARO EQUIPMENT CORPORATION
Bryan, Ohio
Aro of California, 2141 S. Grand Ave., Los Angeles 7, Calif.
Aro Equipment of Canada Ltd., Rexdale (Toronto), Ontario.
Offices in All Principal Cities

For more data circle this page number on card at back of book

Pennsylvania and Maryland

SKF INDUSTRIES, INC., Philadelphia, Pa., announces the appointment of four executives to key posts in the Altoona, Pa., and Philadelphia plants. WILLIAM C. WRIGHT was named to the newly created post of general manager, Altoona division; JAMES A. GRAHAM, formerly plant manager, Philadelphia, succeeds Mr. Wright as production manager; STANLEY KABALA, formerly Altoona plant manager, was appointed plant manager, Philadelphia; and WOODROW WILSON, Altoona supervisor of factory engineering and maintenance, was named manager of the Altoona plant.

T. M. RUTTER has been appointed manager of promotion for CRUCIBLE STEEL COMPANY OF AMERICA, Pittsburgh, Pa. He was formerly supervisor of sales promotion, technical literature, and company displays. Mr. Rutter has been with Crucible since 1952 when he joined the company as senior industrial engineer.

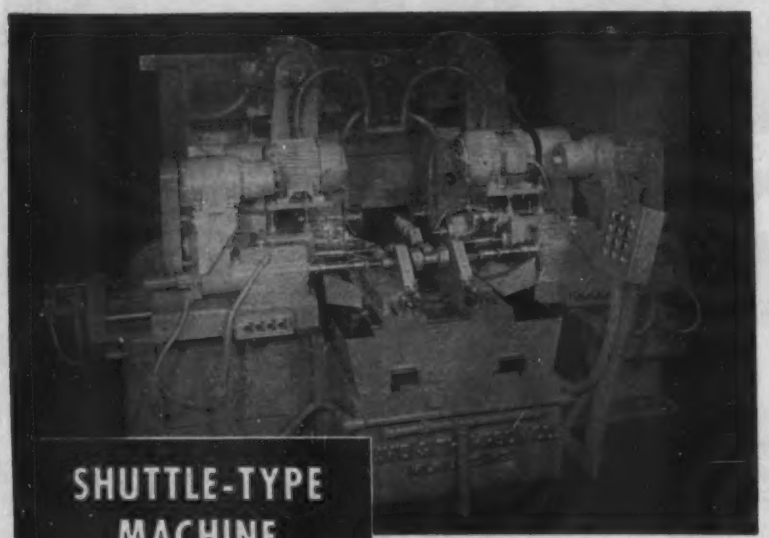
NEBEL MACHINE TOOL CORPORATION, Cincinnati, Ohio, announces the appointment of WRIGHT & GADE TOOL CO., North Broad St., Philadelphia, Pa., as distributor for their lathes in eastern Pennsylvania, southern New Jersey, and Delaware.

M. W. SAXMAN has resigned as president of LATROBE STEEL CO., Latrobe, Pa., but is continuing as chairman of the board. J. E. WORKMAN, formerly executive vice-president, has been elevated to the presidency.

The R. K. LEBLOND MACHINE TOOL CO., Cincinnati, Ohio, has transferred RICHARD L. FULLER to its direct sales office in Philadelphia, Pa. He will serve the company as a sales engineer in that area.

W. C. POTTHOFF, formerly executive vice-president of Aeroprojects, Inc., and president of Sonobond Corporation, has opened offices in West Chester, Pa., as a management consultant.

ALDO J. SARTOR has joined the Detroit office of the PANGBORN CORPORATION, Hagerstown, Md., as sales engineer in charge of vibratory finishing. He was formerly Detroit branch manager, King-Seely Corporation, Almco-Queens Products Division, specializing in precision metal finishing.



SHUTTLE-TYPE MACHINE HANDLES OVER 40 DIFFERENT VALVE PARTS

. . . Mills, Centers, Tap Drills and Taps in #316 Stainless

Here's a good example of engineering a semi-standard machine to handle a lot of parts. Although this machine has been adapted to milling, centering, drilling and tapping of valve parts, its basic design lends itself to other operations through the addition of various types of heads as well as multiple spindle drill heads. Machine incorporates hydraulic controls for table feed and index, two milling heads, two hydraulic power heads, each with center drill and tap drill spindle, and two mechanical screw feed tapping heads to accommodate 16, 20 and 24 pitch threads. Capacities range from ⅜" to 4½" diameter, 5" to 23" long. Parts are inner valves for liquid level controls of tough #316 stainless steel.

If you need high production of one part or moderate production of many parts *with a minimum capital outlay*, it will pay you to call in a D & T production engineer. There is no obligation for this service.

FREE DATA
Write for Bulletin 1002.

Roto-Matic
Davis and Thompson Co.
4460 N. 124th ST. MILWAUKEE 18, WISCONSIN

Obituaries

CHARLES G. ALLEN, general manager and treasurer of the Chas. G. Allen Co., Barre, Mass., for the last thirty years, died on July 17 at the age of eighty-four. Mr. Allen had

Charles G. Allen

LW
MILLING MACHINE
DRILL PRESS SHAPER
VISES

MOGUL
Jaws ½" thick, 8½" wide and 2½" deep open 6" when in place. Wt. 140 lbs.
ONLY $180.00

MASTER
Jaws ½" thick, 6½" wide and 2" deep open 4" when in place. Wt. 90 lbs.
ONLY $90.00

JUNIOR
Jaws ⅜" thick, 4½" wide and 1¾" deep open 2¾" when in place. Wt. 40 lbs.
ONLY $60.00

• Super-Strong • Flange Construction • All surfaces ground for extreme accuracy • Full length bearing on ground bar and machine ways • Steel jaws • Work holding surfaces are always at true right angles, or parallel to the table • Large Acme steel screw with replaceable bronze nut.

L-W ADJUSTO-QUICK CONTROL DRILL PRESS VISE AND FIXTURE HOLDER

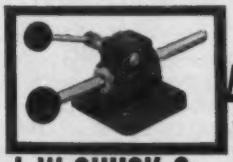
The first wide range drill press vise that safely handles both rigid and non-rigid work without distortion. Quick action and adjustable pressure at the turn of a knob. Easy hand pressure on hardened and micro-ground bar locks and holds the work.

Precision-built to cut tooling costs and increase production. Heavy removable jaw inserts allow simple, quick adaption for low-cost jigs and fixtures.

		Only
4" Model	(5½" Opening)	$31.50
6" Model	(6¼" Opening)	$44.00
8" Model	(8½" Opening)	$57.00

Available with or without swivel base.

SEE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR OR ORDER DIRECT, GIVING DISTRIBUTOR'S NAME



Adjusto-Quick JIG-LOK

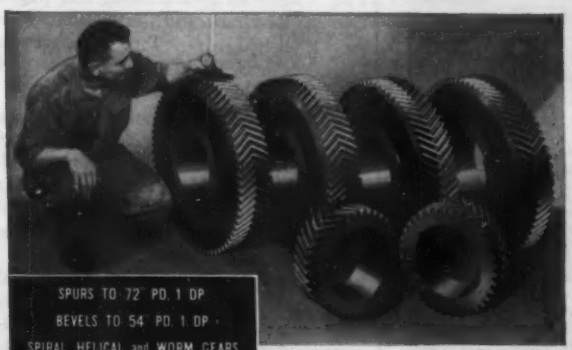
Simplifies jig and fixture design. Pressure adjustment, 1 to 1500 lbs. Easy hand pressure securely holds work without distortion. One inch of the hardened locking bar is cut for easy machining. 4" x 4" base, $20.00, 5" x 5", $25.00

L-W CHUCK Co. 42 S. ST. CLAIR ST. · TOLEDO 4, O.

For more data circle Item 441A

PRECISION for Performance!

In this gleaming group are 2 steel herringbone gears of 28.24" O.D., 6" F., 9¾" B., 69 T., 2½ D.P.—another set of 28.24" O.D., 6" F., 10½" B., 69 T., 2½ D.P. All heat treated to 240-350 Brinell before machining. Pinions—14.4" O.D., 6" F., 7½" B., 36 T., 2½ D.P. Heat treated to 385-400 Brinell after completion. Stahl-built gears measure up—to the job, to specifications. Get our estimate.



SPURS TO 72" PD. 1 DP
BEVELS TO 54" PD. 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD. 2 DP
CONTINUOUS TOOTH HERRINGBONE TO 60" PD. 2 DP
SPROCKETS TO 72" PD. 2½ CP
RACKS TO 20 FT. LONG. 3 DP
SILENT GEARS: RAWHIDE, BAKELITE, FIBROID
HEAT-TREATED CASE OR FLAME HARDENED GEARS—OF CARBON OR ALLOY STEEL

Stahl
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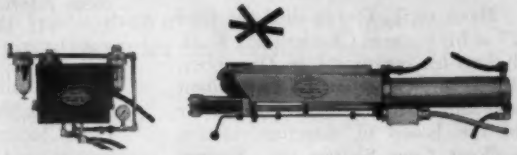

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been associated for sixty-five years with the company founded by his father. During his lifetime, Mr. Allen was active in the civic affairs of his community. He was widely known throughout the metalworking industries.

HESSLAR T. GATES died on June 27 at his home in Charlestown, N. H. Before his retirement in December, 1956, Mr. Gates was vice-president and factory manager, and a member of the board of directors, of the Fellows Gear Shaper Co., Springfield, Vt.

Coming Events

SEPTEMBER 6-16—Machine Tool Exposition, sponsored by the National Machine Tool Builders Association, to be held at International Amphitheatre, Chicago, Ill. For more information: Clapp & Poliak, Inc., 341 Madison Ave., New York City.

SEPTEMBER 6-16—Production Engineering Show, to be held at Navy Pier, Chicago, Ill. For additional information: Clapp & Poliak, Inc., 341 Madison Ave., New York City.

SEPTEMBER 7-15—Second International Coliseum Machinery Show to be held at Chicago Coliseum, Chicago, Ill. For further information, write: A. Byron Perkins & Associates, 2807 Sunset Blvd., Los Angeles 26, Calif.

SEPTEMBER 26-29—National Fall Meeting of the American Welding Society to be held at the Hotel Penn-Sheraton, Pittsburgh, Pa. For additional information: Arthur L. Phillips, American Welding Society, 33 W. 39th St., New York 18, N. Y.

OCTOBER 17-21—Forty-Second National Metal Exposition and Congress, sponsored by American Society for Metals, to be held at Philadelphia Trade and Convention Center, Philadelphia, Pa. For additional information: Chester L. Wells, exposition manager, American Society for Metals, Metals Park, Novelty, Ohio.

NOVEMBER 14-18—Third Western Tool Show sponsored by the American Society of Tool Engineers, to be held at the Memorial Sports Arena in Los Angeles, Calif. For additional information write Leonard Abrams, exposition manager, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 38, Mich.

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THE NEW PRODUCT. (Subtitle: How to find, test, develop, cost, price, protect, advertise, and sell new products.) By Delmar W. Karger. 6 by 9 inches; 234 pages; 21 charts and illustrations. Published by THE INDUSTRIAL PRESS, 93 Worth St., New York 13, N. Y. Price, $5.

This book describes in detail how to find ideas for developing, selling, advertising, and pricing new products. It provides useful checklists that aid the manager to avoid common pitfalls, helping him to achieve success.

The entire subject is approached from the general manager's viewpoint. Basic concepts of top-management planning, and organizing the development of a new product are covered, as well as each major functional area of the business concerned with development and marketing. Mr. Karger's book is a useful guide, providing some answers for the far-sighted manufacturer who wants to develop a profitable market for his new products.

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Basic Concepts; Organizing for Product Development; Finding New Product Ideas; Costing and Pricing the New Product; Patents; Research and Engineering; Sales; Advertising; and Management Considerations of New Product Development. Also included is an extensive, alphabetically arranged bibliography, valuable for additional information.

For almost twenty-five years, author Delmar W. Karger has been a registered engineer, industrial engineer, business manager, and Manager of New Product Development for both the Government and the Industrial Division of the Magnavox Co. He is now Professor and Head of the Department of Management Engineering, Rensselaer Polytechnic Institute. He has authorized numerous magazine articles, and in collaboration with Franklin H. Bayha, they wrote *Engineered Work Measurement*, an authoritative text on Methods-Time Measurement.

MACHINE-SHOP ESTIMATING. Second edition. By W. A. Nordhoff. 532 pages; 344 illustrations; 6 by 9 inches. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price, $9.

This is a new edition of a manual designed to help readers estimate the time any machining job will take. All the machining operations performed in the average shop are covered, with a description of each machine and the work it does, data for making estimates of its operations, and a sample estimate. Based on the author's own time-study and estimating experience, time values are given for every operational element which the estimator may then combine to find total time for a job from setting up to completion.

Relation between production and equipment horsepower is discussed. Tables have been increased and enlarged to include such information as power constants and horsepower factors; relative machining factors for various qualities of cutting materials and different types of cutting tools; estimating data for the turret drill press, the Cri-Dan threading machine, and drilling by the electrical-discharge method. Machine tool data of horsepower, spindle-speed, and feed ranges reflect modern operating conditions.

The author brings to this book more than twenty-five years' practical experience in time study and estimating for industry.

CEMENTED CARBIDES. By Dr. Paul Schwarzkopf and Dr. Richard Kieffer. 349 pages; illustrated; 6 by 9 inches. Published by the Macmillan Co., 60 Fifth Ave., New York 11, N. Y. Price, $15.

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The opening chapters furnish background information and describe the methods of producing carbides and other metallic refractories. Middle chapters describe the mechanical and chemical properties of all the cemented carbides in commercial production and those which are being produced in experimental quantities. The final chapters concentrate on the many applications of cemented carbides to the machine tool, mining, and other industries.

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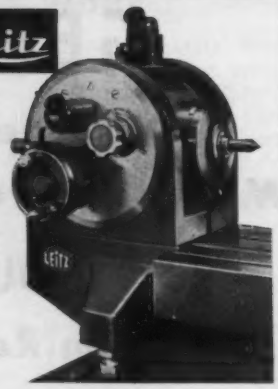

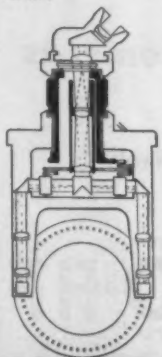

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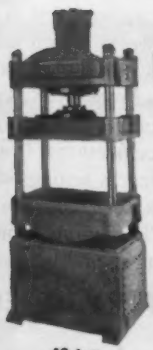

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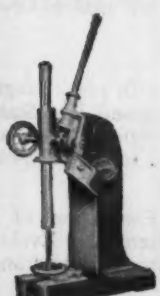

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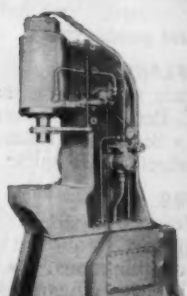

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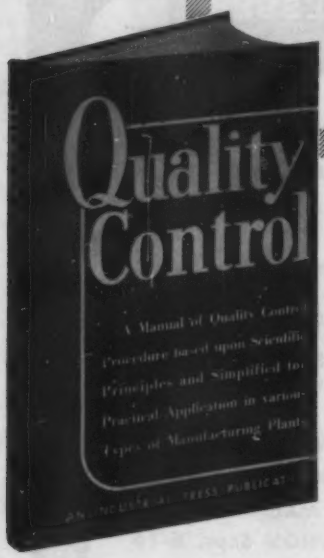

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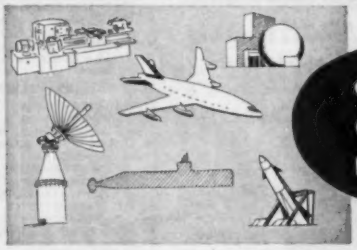

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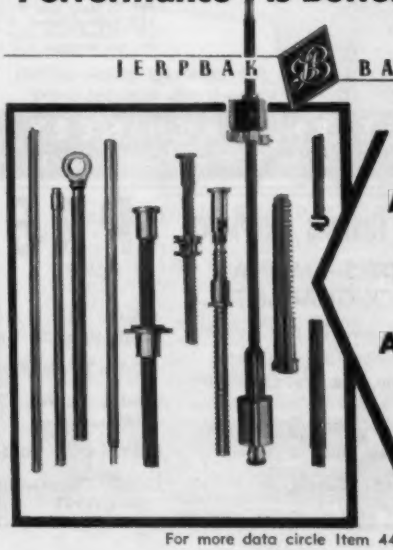

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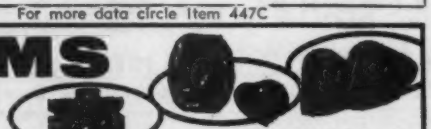

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No. 7, 7A Fellows, belted m.d.
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Grinder, Internal, No. 271 Heald plain
Grinder, Internal, No. 24/36 Bryant hydraulic hole
Grinder, Surface, 20" No. 25A Heald hydraulic rotary
Grinder, Type NRS Barber Colman hob, cutter and reamer
Grinder, No. 35L Ex-Cell-O, thread
Hone, No. 224 Barnes vertical internal, hydraulic
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Lathe, Automatic, 15"x42" Monarch Magnamatic
Lathe, Engine, 16"x30" Monarch Model C
Lathe, 30"x10' ex Miles Tool Works Timesaver
Lathe, Production, 20"x90" ex LeBlond
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Lathe, Turret, No. 4L Gisholt heavy duty, saddle type, cross feeding turret
Lathe, Boring, 4" Universal Tri-Way horizontal
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Press, Drawing, 350 ton No. 18-T Cleveland, SC, dbl. action
Press, Horn & Wire, 32 ton No. 24 Bliss Consolidated
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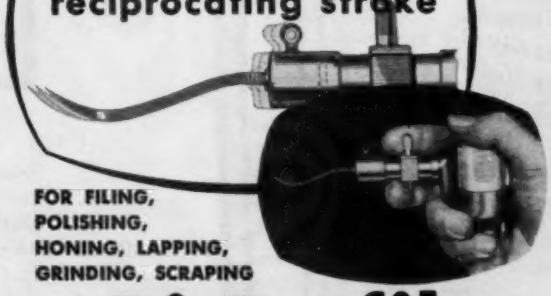

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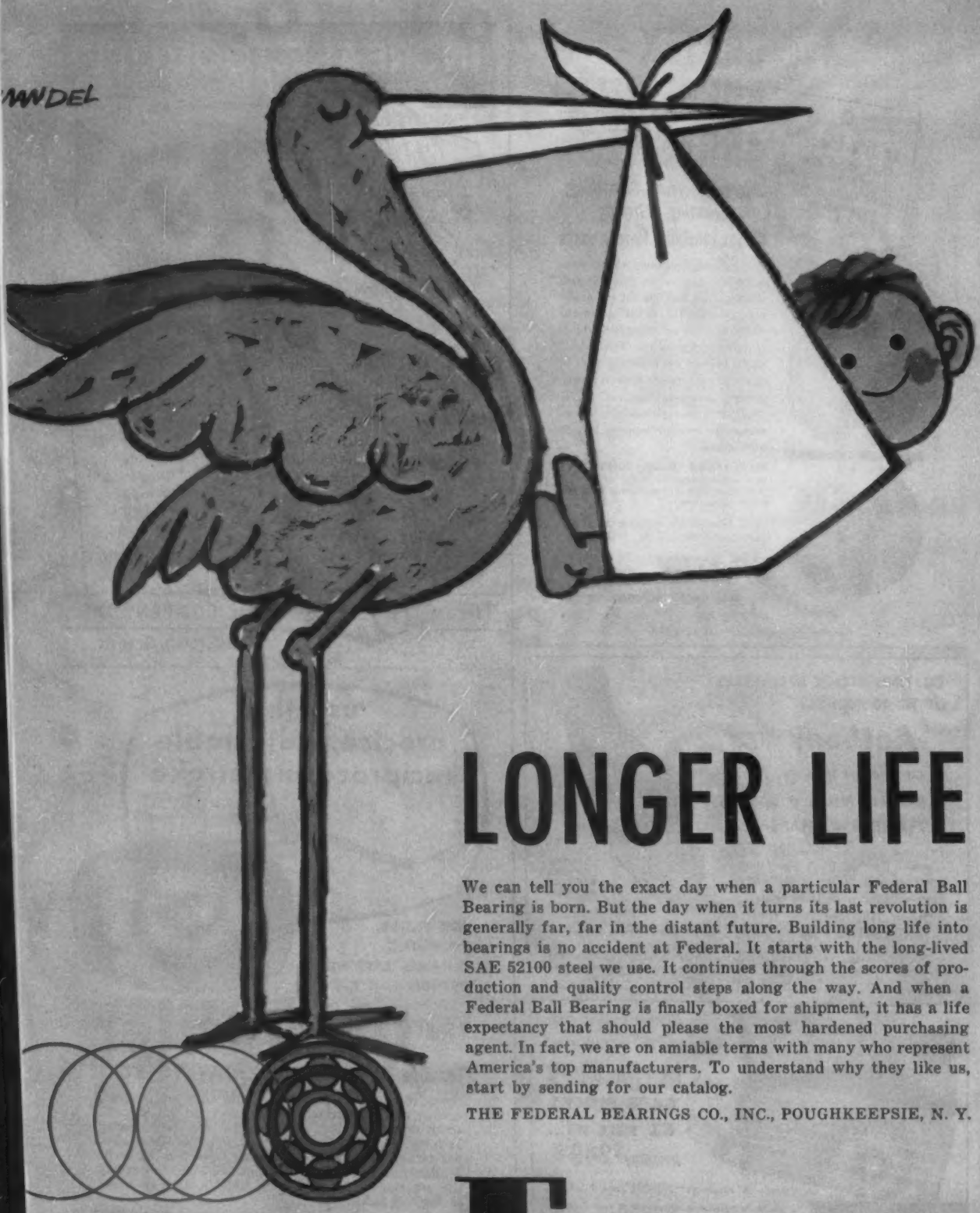

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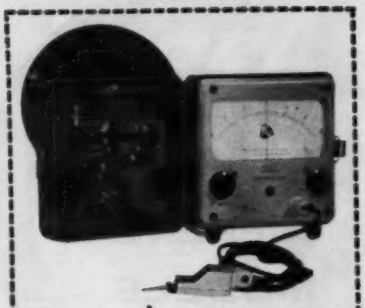

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MICROMETERS

Whatever your micrometer requirements, chances are Slocomb has it. Slocomb micrometers range from the 1" conventional micrometer calipers to 60" Rigitube models. Airfoil, tube, screw thread and sheet metal types . . . just to mention a few of the many available specials . . . as well as the new Slocomb Snap Gage micrometer, designed to eliminate a complete line of fixed snap gages.

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HIGH FREQUENCY INDUCTION HEATING UNITS

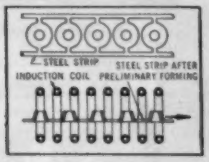
Lepel induction heating equipment represents the most advanced thought in the field of electronics... the most practical and efficient source of heat developed for numerous industrial applications. You are invited to send samples of work with specifications. Our engineers will process and return the completed job with full data and recommendations without cost or obligations.

TYPICAL INDUCTION HEATING APPLICATIONS

PLASTIC COATING OF TOOL HANDLES

A production line operation for coating handles of tools at Whitney Metal Tool Co., Rockford, Ill. uses induction heating with excellent results. The handles only are heated by induction to the desired temperature then dipped into a vinyl chloride base coating material for a short period depending upon the thickness of coating desired. The plastic coating formed on the handles is then cured by immersion in a carbo-wax bath.

FORMING OF METAL STRIP FACILITATED BY PROGRESSIVE ANNEALING



Metal forming operations which require intermediate anneals to restore ductility can be facilitated by induction annealing the strip progressively. Diagram illustrates this procedure for partially formed thin austenitic stainless steel strip. The induction annealing operation is scheduled in the production line between two press operations. Metal strip and wire of other materials are also induction annealed in this manner.

WRITE FOR NEW LEPEL CATALOG
Electronic Tube Generators from 1 Kw to 100 Kw
Spark Gap Converters from 2 Kw to 30 Kw.

LepeL HIGH FREQUENCY LABORATORIES, INC.
55th ST. & 37th AVE., WOODSIDE 77, N. Y.

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Typical Rotoblast Barrel, Ft. Pitt Steel Castings Co., McKeesport, Pa.

proves itself again...and again...and again!

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MEADVILLE MALLEABLE IRON CO., MEADVILLE, PA.—Pangborn Rotoblast cut 24 man-hours daily to 15 . . . cleans loads three times as large in half the time.

INGERSOLL RAND CO., PAINTED POST, N.Y.—Pangborn Rotoblast cleans 74,000 lbs. of castings per day, cuts cleaning time in half and substantially reduces costs.

BUCKEYE IRON & BRASS CO., DAYTON, OHIO—Pangborn Rotoblast is automated to reduce labor requirements even further, cuts 15 minutes blast time to just 4½.

Results like these explain why two of the world's leading automotive manufacturers have just ordered *nine* 32 cu. ft. capacity Rotoblast Barrels! If your problem involves blast cleaning, talk to your Pangborn man or write PANGBORN CORPORATION, 1200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning, Vibratory, Dust Control Equipment—Rotoblast® Steel Shot and Grit.®*

Pangborn
OF HAGERSTOWN

Find sources for more data, quickly, easily. Use MACHINERY'S product index on preceding pages. Advertisers in this issue are listed alphabetically by product. Page numbers following company names indicates both location of ad and number to be circled on cards for more data.

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to obtain free literature on products advertised or described in this issue

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information center

Reverse side of this card gives instructions on how to use postcards below to obtain new catalogs, data on new equipment described, and products advertised in this issue. In the product index immediately preceding these cards advertisers are listed by product group to facilitate location of advertisements on which you desire additional data and catalogs.

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New York, N. Y.

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MACHINERY
93 WORTH STREET
NEW YORK 13, N.Y.

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New York, N. Y.

BUSINESS REPLY MAIL
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93 WORTH STREET
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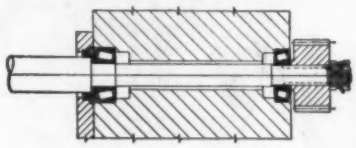

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